

APRIL  
1937

# Rock Products

WHICH IS CONSOLIDATED WITH THE JOURNALS

**CEMENT** Engineering **NEWS** (Est. 1896)

**CONCRETE**  
**PRODUCTS** (Est. 1918)

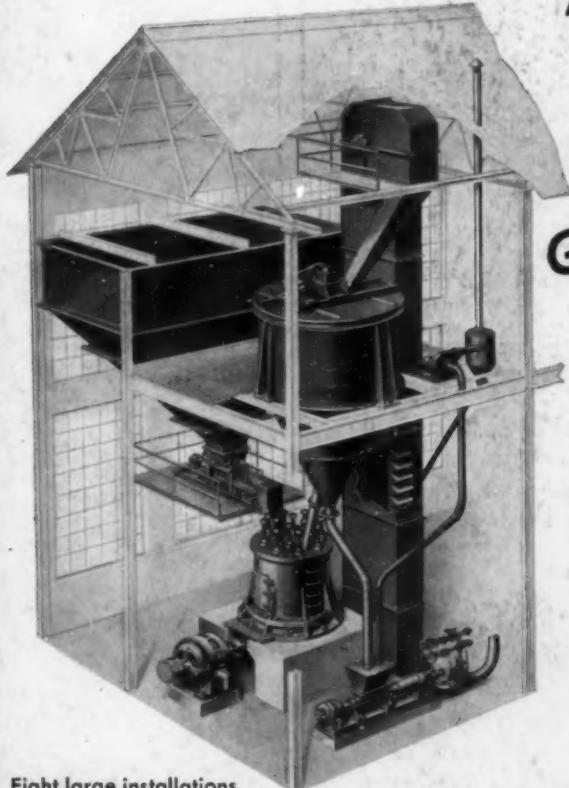
THE OLDEST PUBLICATION IN ITS FIELD AND THE RECOGNIZED AUTHORITY.

15 1937

for  
These New Problems

of the Cement  
Industry

- 1 Rising costs of manufacture.
- 2 New cement specifications.
- 3 Finer grinding resulting in higher temperatures in grinding unit, coated grinding elements, greater power costs, and reduced production.



**NEW  
GRINDING METHODS  
are required**

The Ball Bearing Principle of Grinding Provides a New and Better Method of Cement Production.

30-50% saving in power costs.

Any surface area up to 3100 sq. cm. per gram—at will.

Low temperatures—without water-cooling.

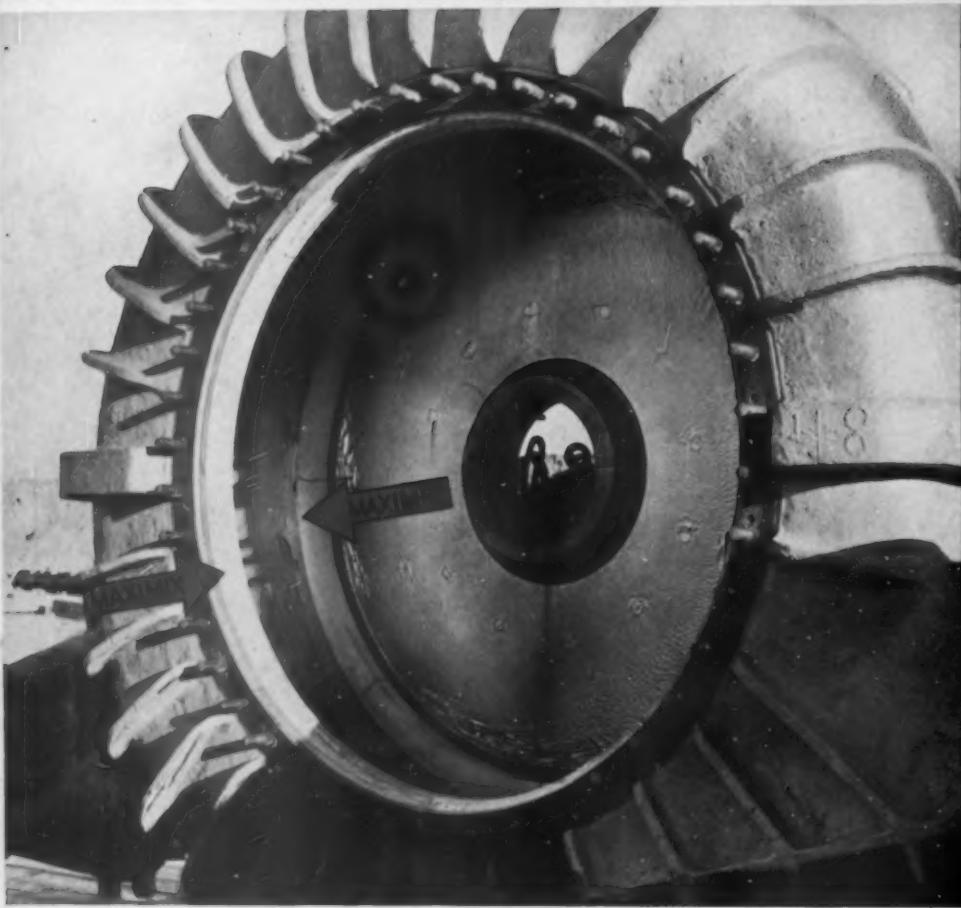
No coating of grinding elements.

Large production from single units.

THE BABCOCK & WILCOX COMPANY  
85 LIBERTY STREET . . . NEW YORK, N. Y.

Eight large installations of B & W Type B Pulverizers are now under construction—five are repeat orders.

## BABCOCK & WILCOX



# Comparison of **MAXIMIX RUBBER** with **METAL** after Pumping **1,200,000 yds**

Two pumps in the same line, one pump with Maximix Rubber Parts and the other with similar parts of the hardest, practical alloy steel. Both pumps handled 1,200,000 yards of the same material. Maximix Rubber (indicated by colored arrows) shows practically no wear, while the equivalent metal parts (indicated by white arrows) are worn to the extent that they require replacement with new "more-expensive-than-rubber" parts . . . The side plate liner and other parts of the Hydroseal Dredge Pump are moulded of Maximix Rubber, which generally outlasts metal three to six times. The Hydroseal Principle of introducing clear water on each side of the impeller invariably saves 35% in pumping power costs. Address the nearest office listed below for a copy of new Catalog No. 3-836.

**HYDRO SEAL**  
Dredge Pump **MAXIMIX** Protected

HYDROSEAL AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTRES OF THE WORLD

The ALLEN-SHERMAN-HOFF CO. • 221 South 15th Street • PHILADELPHIA, PA.  
OFFICES AND REPRESENTATIVES IN MOST PRINCIPAL CITIES



## FOR FORT PECK DAM

● The top picture shows some of the many piles formed by reject material (sand) from two Link-Belt traveling preparation plants, owned and operated by the Becker County-Shiely Co., Cole, Mont. The circle insert shows one of these plants.

They produce "toe" or bottom gravel for the slope of this earth-filled dam. Prepared material is loaded into railroad cars for delivery to the dam.

The stationary plant shown in the background (upper illustration) was also designed and built by Link-Belt for J. L. Shiely Co., Cole, Mont., and produces washed and screened sand and gravel for concrete tunnel lining, retaining walls, spill-ways, etc.

Send for Book No. 1240, "Equipment for Preparing Sand, Gravel, Stone, by Link-Belt."

Link-Belt Company, Chicago, Philadelphia, Indianapolis, Atlanta, San Francisco, Toronto, or any of our other offices in principal cities.



# LINK-BELT

*Equipment for Preparing Sand, Gravel, Stone*

# Rock Products

Which is consolidated with the journals

## CEMENT and ENGINEERING CONCRETE NEWS PRODUCTS

Founded 1896 Est. 1918

Entered as second-class matter, Jan. 30, 1936, at the  
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RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

### Table of Contents for April, 1937

Trends, Reviewed by the Editor.....	43-44
Profit Opportunity to Market Fine Sand for Vibrated Concrete .....	45-47
By Stanley M. Hands.	
Longest Rotary Lime Kiln.....	48-54
Chemical Lime Company's New Plant at Belle- fonte, Penn., Has Several Special Features for Quality Control.	
By Bror Nordberg.	
Motor Trucking Costs in Southern California.....	55-57
By Geo. D. Roalfe.	
Screening 3000-Pound Rocks at Basalt Rock Co., Napa, Calif. ....	58-59
By Louis Cassayre.	
Soft Stone Eliminator.....	60-63
Specially Built for Consolidated Rock Products Co., Los Angeles, Calif., Gives Product That Passes Severe Rattler Test.	
By Edmund Shaw.	
Cements and Sea Water.....	64-67
Resumé of Literature and an Example of Modern Trends in Making Special Cements for Sea-Water Resisting Construction.	
By Alton J. Blank.	
More on Burning of Spalls.....	76-77
By Victor J. Azbe.	
Splicing Conveyor Belt With Belt Fasteners.....	78-79
Protecting Diesel Engines from Dust.....	80-81
By E. Kundig.	
Secretary Ahearn's Visit to Los Angeles.....	82-83
Safety Meetings Under Way..... 83	
Regional Conferences by Cement Association Stir Enthusiastic Interest.	
Modernism in Concrete..... 87	
Concrete Joint and Filler Block Floor System..... 89-93	
Bedford Hills Concrete Products Corporation Makes Full Products Line—Produces Aggregates, Block, Pipe and Ready-Mix.	
Concrete Products Cured Electrically..... 94-95	
Rapid Turnover of Stock, Reduced Shrinkage Are Advantages.	
Gravel and Pipe Produced at New Culvert Plant on Indian Reservation, Fargo, N. D..... 95-96	
By H. M. Fitch.	
Merchandising Concrete Products—Part 5..... 97-98	
By Harold O. Hayes.	
Departments	
Editorial Comments .....	43-44
West Coast Section .....	55-57
Chemists' Corner .....	64-67
Hints and Helps .....	68-69
The Readers Write .....	70-71
Financial News and Comment .....	72-73
Traffic and Transportation .....	74-75
Lime Producers' Forum .....	76-77
New Machinery and Equipment .....	84-85
Concrete and Cement Products .....	87-101
Digest of Foreign Literature .....	102
News of the Industry .....	103-105
Classified Directory of Advertisers .....	116, 118, 119, 120, 121, 122

(Rock Products is indexed in the "Industrial Arts Index," which can be found in any Public Library)

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## TRADEPRESS PUBLISHING CORPORATION

205 West Wacker Drive, Chicago, Illinois, U. S. A.

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SUBSCRIPTION—Two dollars a year to United States  
and Possessions. \$2.00 a year to Canada and  
\$4.00 to foreign countries. Twenty-  
five cents for single copies



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*A typical example of Goodrich product development*

YOU'VE answered every other question an active little mind could think of, but how about this one? Junior wants to put in a private line to Billy's house; he doesn't like wire or rope. Where can he get a string that won't stretch?

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ALL *products* *problems* IN RUBBER

# THEY'LL JUST GO *on and on*



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**Y**OU'LL get far longer life from them, once you begin lubricating your wire rope and gear teeth with Texaco Crater.

You'll see the result, immediately. Your wire rope will lose its dry and rusty look. Your open gears will stop their annoying clank and clatter.

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☆ ☆ ☆

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135 East 42nd Street • New York City



## **TEXACO** *Industrial Lubricants*



# They Checked Up ... AND BOUGHT JAEGERS

"After checking merits decided to buy two Jaeger 3-yd. Agitators. When more are purchased our choice will again be Jaegers."

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"Our observation covering competitive mixers in Miami area reveals Jaegers are in a class by themselves. Our first installation of three was followed by 7 additional in three months."

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Miami Beach, Fla.

"Have operated other makes but my Jaegers fulfill all demands 100% for accurate performance and low operating cost."

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"Have had four Jaegers in past 4½ years—have given us exceptionally good service—get a wonderful mix and it takes less time than in other types we have rented. Maintenance costs have been very low. Have been averaging 100 cu. yds. of concrete per day for last 7 months. We recommend your Mixer to prospective buyers."

MARION COAL & SUPPLY CO.,  
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"Since we bought our first Jaeger, nearly three years ago, we have been sold on it, as the machine, operated with competition, has been our best salesman. Economy, service and the way the machine does its job under all conditions, led us to reorder two Jaegers."

TRANSIT MIXED CONCRETE CO., INC.,  
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HIGH REAR LIFT  
ATTACHMENT—  
75% More Spouting  
Area!



"Before going into truck mixers," states KEEFNER CONCRETE & MATERIAL CO., Des Moines, Ia., "we thoroughly analyzed and investigated all competitive equipment. Our decision to purchase Jaegers has proven very wise for several reasons. First, an immediate increase in our business. Second, while parts needed have been negligible, it is a satisfaction to buy them from a dealer still in business. Third, it is a well balanced, most economical outfit to operate. Some of our mixers are on their third chassis. After observing other ready mixed operations in various parts, we feel our Jaegers give a more thorough mix, discharge is fast and continuous—without segregation. Fewer spaders and puddlers required. They are easy on trucks, surprisingly long tire life and mileage. Have our unqualified recommendation."

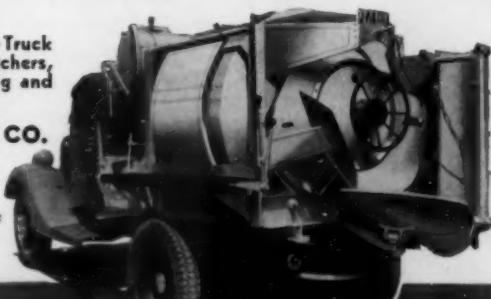
Plant after plant, both newcomers and veterans, are finding that the way to get the most customers and the most profit for their sand, stone and cement is to sell Jaeger HIGHER STRENGTH Concrete, mixed and delivered in Jaeger Dual-Mix Truck Mixers. When they check up they find that Jaeger End-to-End Mass Mixing and Smooth, Continuous Flow Discharge produce a stronger, more workable concrete preferred by both engineers and contractors. And they find that Jaeger features of speed, efficiency and low cost operation and maintenance give Jaeger operators a recognized advantage in serving this market PROFITABLY.

Jaeger Service is Complete—Truck Mixers, Agitators, Bins, Batchers, Tipple Tanks—Get Our Catalog and Prices Before You Buy!

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Columbus, Ohio

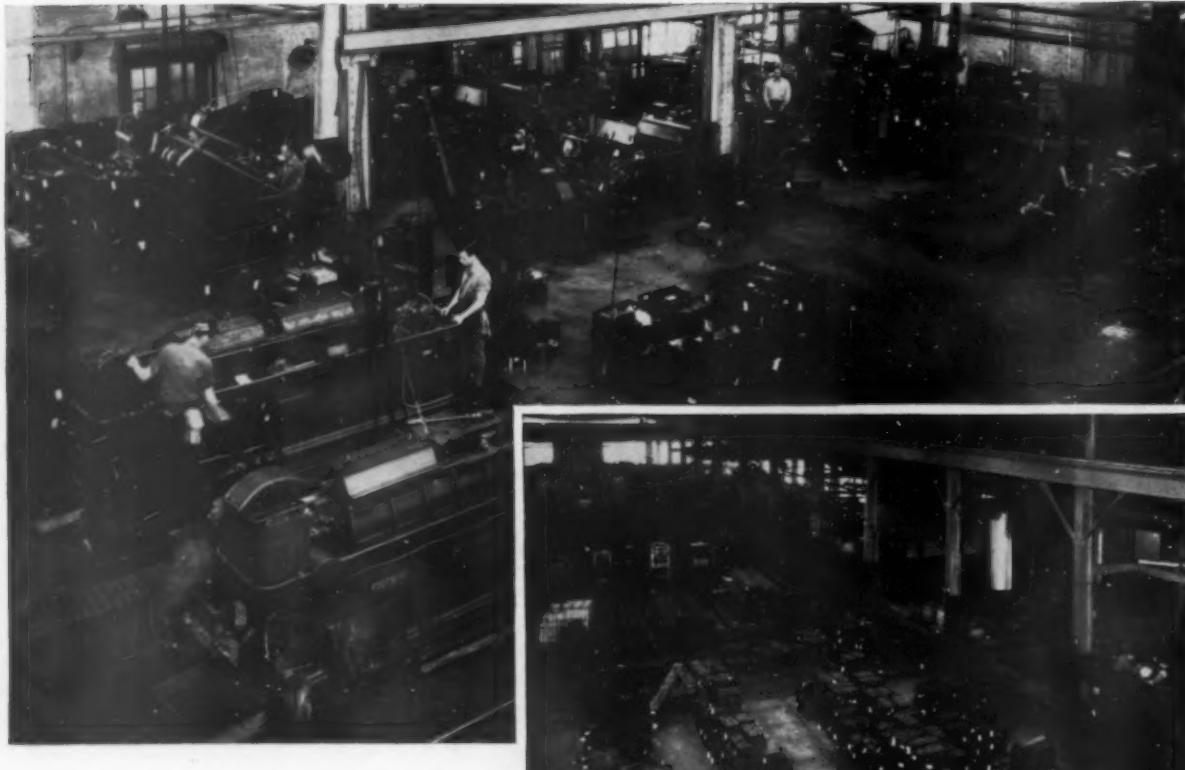
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As in the manufacture of TIMKEN Bearings and TIMKEN Alloy Steels, quality control is an important factor. Nothing is left to chance, and



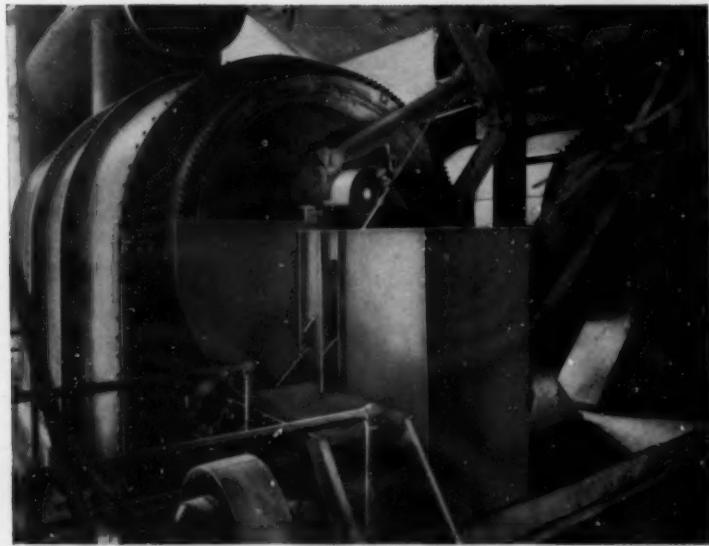
the human element—particularly in such critical processes as heat treatment—is eliminated as far as possible. Modern scientific instruments take the place of human judgment. From the cutting of the steel bars into forging slugs to the time the finished bits reach the packing department there is hardly a chance for an imperfect piece to escape detection. True to the Timken tradition, this plant is your assurance of maximum service and satisfaction when you use TIMKEN Bits.

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Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

**TIMKEN**  
**ROCK BITS**

*note  
carefully*



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- Scrubbers
- Evaporators
- Jaw Crushers
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- Crushing Rolls
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- Tube Mills
- Pug Mills
- Wash Mills
- Feeders
- Rotary Screens
- Elevators
- Welded or Riveted Stacks, Tanks and Bins for any purpose.

*when you install a*  
**COLTON-LANG  
RECUPERATOR-**

immediately, you'll discover to your great satisfaction that you have made a two-fold gain—a very considerable saving in fuel and a large increase in the capacity of your kiln.

The Colton-Lang Recuperator uses the heat of combustion in the kiln for drying the slurry and delivers the slurry to the kiln in a relatively dry state. We have some very significant figures from one cement company, which is operating an oil-fired kiln. Before installing our Colton-Lang Recuperator the production from this kiln was 1,650 barrels from slurry containing 41% moisture and the

kiln consumed 11.4 gallons of oil per barrel.

After the Recuperator had been attached to this kiln the moisture in the slurry was reduced to 19%, the capacity was increased to 1,825 barrels and the fuel consumption was reduced to 8.6 gallons per barrel.

Compared with such a saving, the cost of installing a Colton-Lang Recuperator is a very small matter. Therefore, this apparatus deserves your careful investigation. Write our office nearest you for our Bulletin 115.

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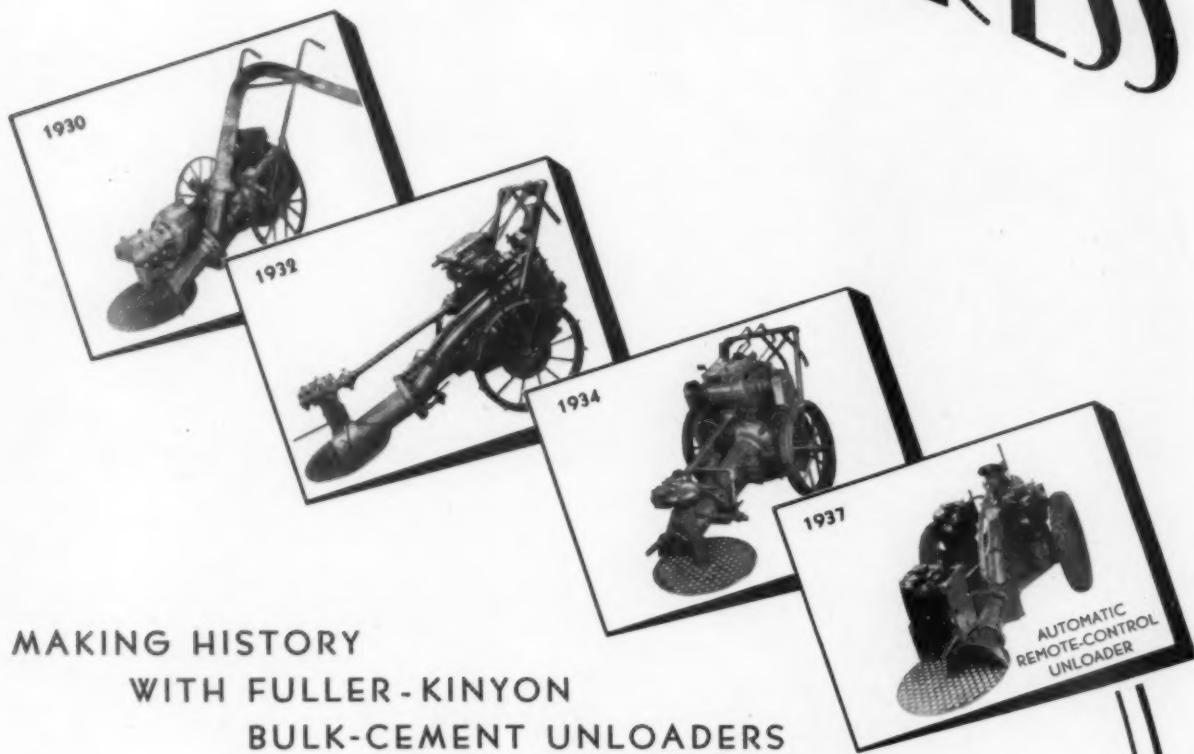
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# THE PARADE OF PROGRESS



## MAKING HISTORY WITH FULLER-KINYON BULK-CEMENT UNLOADERS

The great American spirit, progress, is exemplified by the steady refinements and improvements to the Fuller-Kinyon Portable Unloader.

Starting in 1930, with the increased demand for cement shipments in bulk on construction work such as highways, bridges, large buildings, and ready-mix concrete plants, the Fuller Company, pioneers in conveying pulverized materials through pipe lines, built and placed in service the first Fuller-Kinyon Unloader. This machine filled a much felt need, although a far cry from the new Fuller-Kinyon Automatic Remote-Control Unloader.

Always pioneering, and the aim to do a better job, Fuller engineers kept everlastingly at it, with the result that today the Company can offer, with the utmost confidence, this really efficient and unique machine.

**SAFETY**—Safe for use in cement mill stockhouses. Remote control keeps the operator out of the bin...out of danger from slides...out of the dust.

As illustrated, this latest model is everything that the name implies, a machine that can be handled by remote control at a distance by means of a hand control switch. Starting and stopping; movements of the machine: forward, backward, right or left, all are governed from this simple control.

These are only a few of the distinctive features. For complete details send for your copy of the folder fully describing and illustrating the Fuller-Kinyon Automatic Remote-Control Unloader.



**FULLER COMPANY**  
CATASAUQUA, PENNSYLVANIA

Chicago: 1118 Marquette Bldg.  
San Francisco: 320-321 Chancery Bldg.

P-23

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS . . . ROTARY FEEDERS AND DISCHARGE GATES  
ROTARY AIR COMPRESSORS AND VACUUM PUMPS . . . AUTOMATIC BATCH WEIGHERS . . . BIN SIGNALS

# 5-R DRIVES CRUSHERS AND COMPRESSORS AT 25% TO 50% LOWER TENSION!

HERE are the reasons why you should immediately investigate the remarkable new Goodyear 5-R Belt—the only square-edged flat fabric transmission belt in the world with a PERMANENT minimum ratio of tension, or "R," of 5:

**HIGHEST COEFFICIENT OF FRICTION**—a tenacious pulley-grip unsurpassed in any other type of belt!

**PERMANENT FACE ADHESION**—5-R is distinctive for the permanence of its adhesion value. 5-R surface will not crumble, ball up or chatter. High face adhesion may be obtained temporarily on ordinary belts by recourse to belt dressing or use of rosinous compounds.

**OPERATES AT SLACK TENSION**—approximately 25% to 50% less tension than other belts; greatly lessens strain on both belt and fasteners with corresponding increase in belt life!

**REDUCES BEARING PRESSURES**—lengthens bearing life, lessens lubrication problems, lowers frictional losses and cuts power costs.

The G. T. M.—Goodyear Technical Man—will be glad to explain how 5-R's unequaled efficiency and economy will save money on any drive in your plant. To bring him, write Goodyear, Akron, Ohio, or Los Angeles, California—or the nearest Goodyear Mechanical Rubber Goods Distributor.

## LOOK AT THE DIFFERENCE

100 LBS.  
effective  
tension

### SLACK SIDE TENSION

Ordinary Rubber Belt

—100 lbs.

Goodyear

5-R Belt—25 lbs.

### TIGHT SIDE TENSION

Ordinary Rubber Belt—200 lbs.

Goodyear 5-R Belt—125 lbs.

The new Goodyear 5-R Belt is made in roll lots in all sizes and widths; easily applied with any standard fastener.

BELTS  
MOLDED GOODS

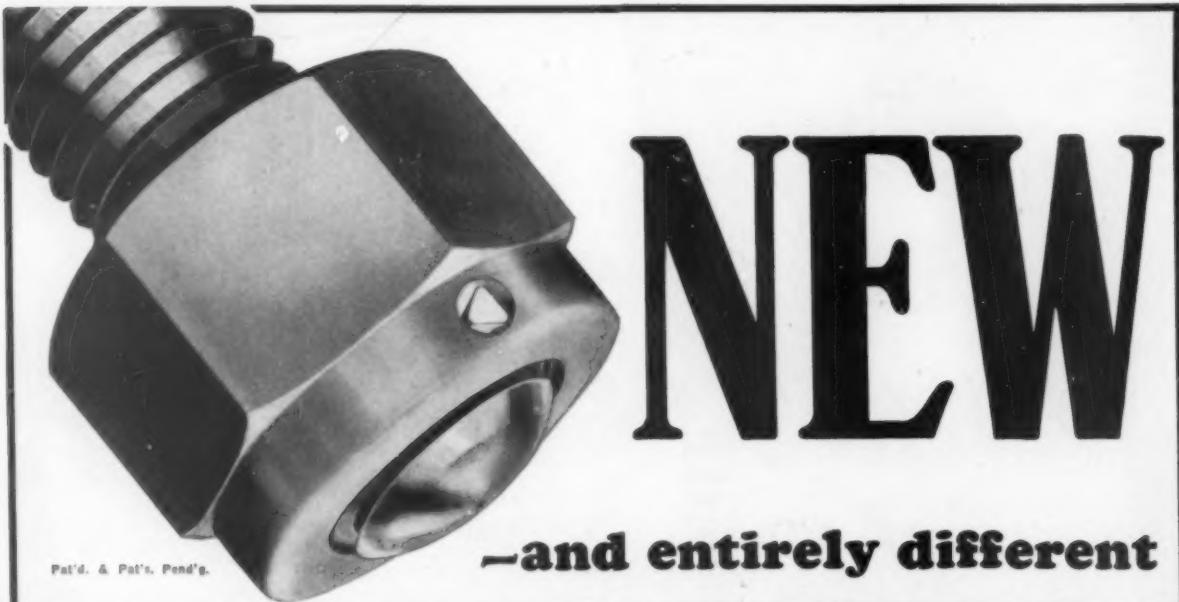
HOSE  
PACKING

Made by the makers of  
Goodyear Tires

THE GREATEST NAME

IN RUBBER

# GOOD YEAR



# NEW

—and entirely different

## THE NUT THAT CAN'T SHAKE LOOSE

### UNSHAKO

#### SELF-LOCKING NUT

—It's Self-Contained—

It will pay you to find out all about "Unshako", the nut that can't work loose even when subjected to severe and continuous vibration—yet it backs off readily with the aid of an ordinary wrench. It's self-contained—no separate pins or washers to be forgotten or lost. A built-in, self-locking ring or floating thread that works on the brake band principle, does the trick.

"Unshako" is the real solution wherever shock and vibration shake ordinary nuts loose. Can be re-used as often as desired.

Use the coupon and get the complete facts.

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Also makers of the famous "Unbrako" Screw Line

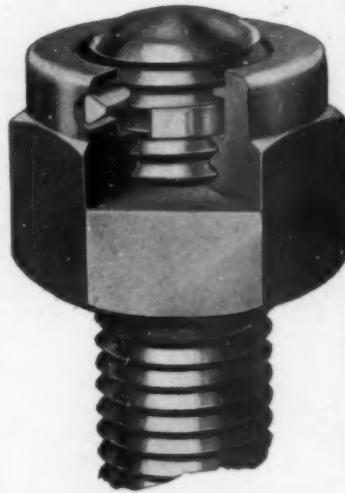


FIG. 1510 "UNSHAKO"  
SELF-LOCKING NUT  
Cutout section shows the Locking Ring  
in position.

STANDARD PRESSED STEEL COMPANY  
Box 563, Jenkintown, Pa.

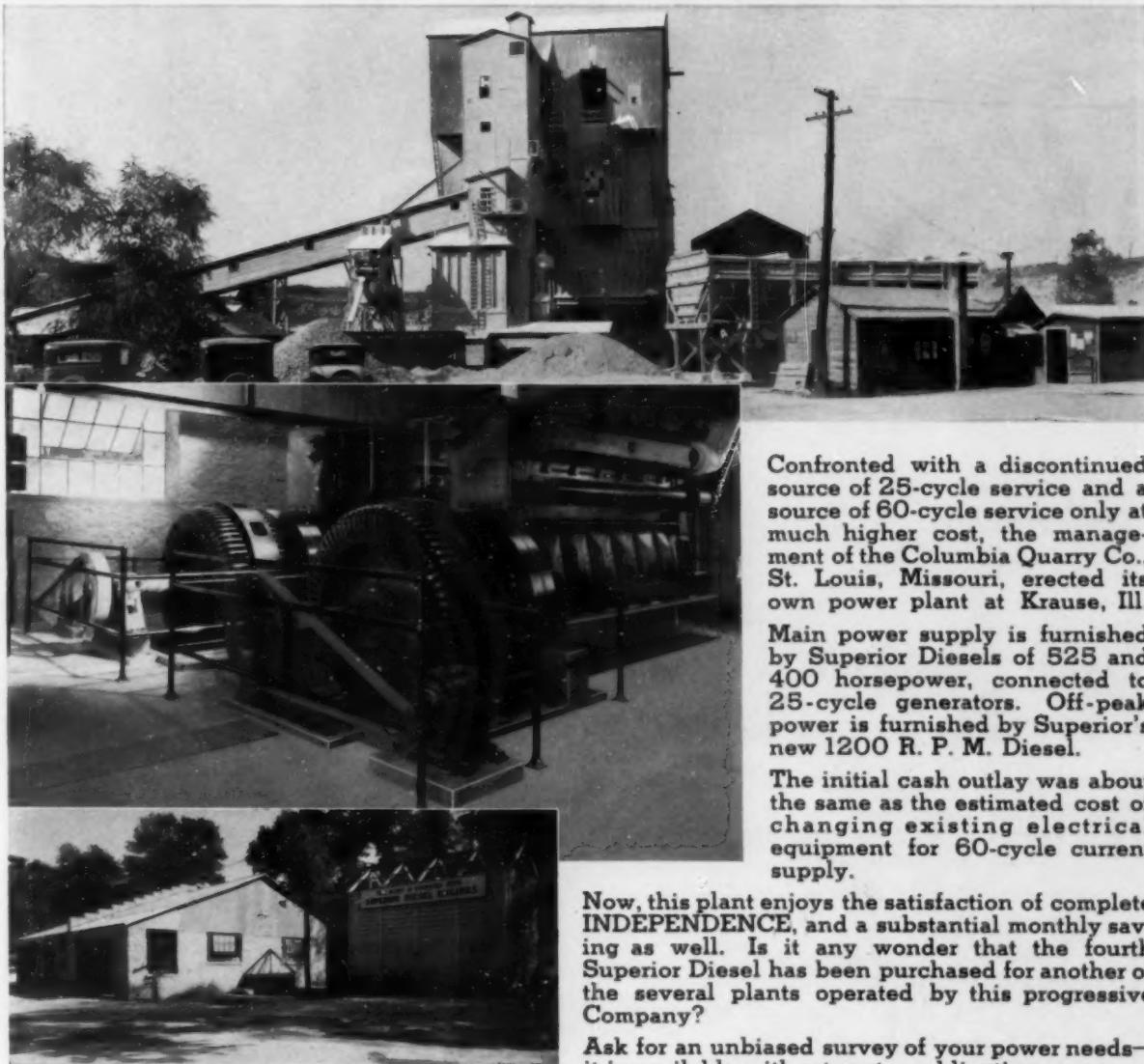
Gentlemen:

We would like to hear more about "Unshako" Self-Locking Nuts, and why you think it would pay us to use them.

Mr. \_\_\_\_\_ Title \_\_\_\_\_

Firm \_\_\_\_\_ Address \_\_\_\_\_

# Crushing Power... 1.3 to 2.3 cents per ton



Confronted with a discontinued source of 25-cycle service and a source of 60-cycle service only at much higher cost, the management of the Columbia Quarry Co., St. Louis, Missouri, erected its own power plant at Krause, Ill.

Main power supply is furnished by Superior Diesels of 525 and 400 horsepower, connected to 25-cycle generators. Off-peak power is furnished by Superior's new 1200 R. P. M. Diesel.

The initial cash outlay was about the same as the estimated cost of changing existing electrical equipment for 60-cycle current supply.

Now, this plant enjoys the satisfaction of complete INDEPENDENCE, and a substantial monthly saving as well. Is it any wonder that the fourth Superior Diesel has been purchased for another of the several plants operated by this progressive Company?

Ask for an unbiased survey of your power needs—it is available without cost or obligation.

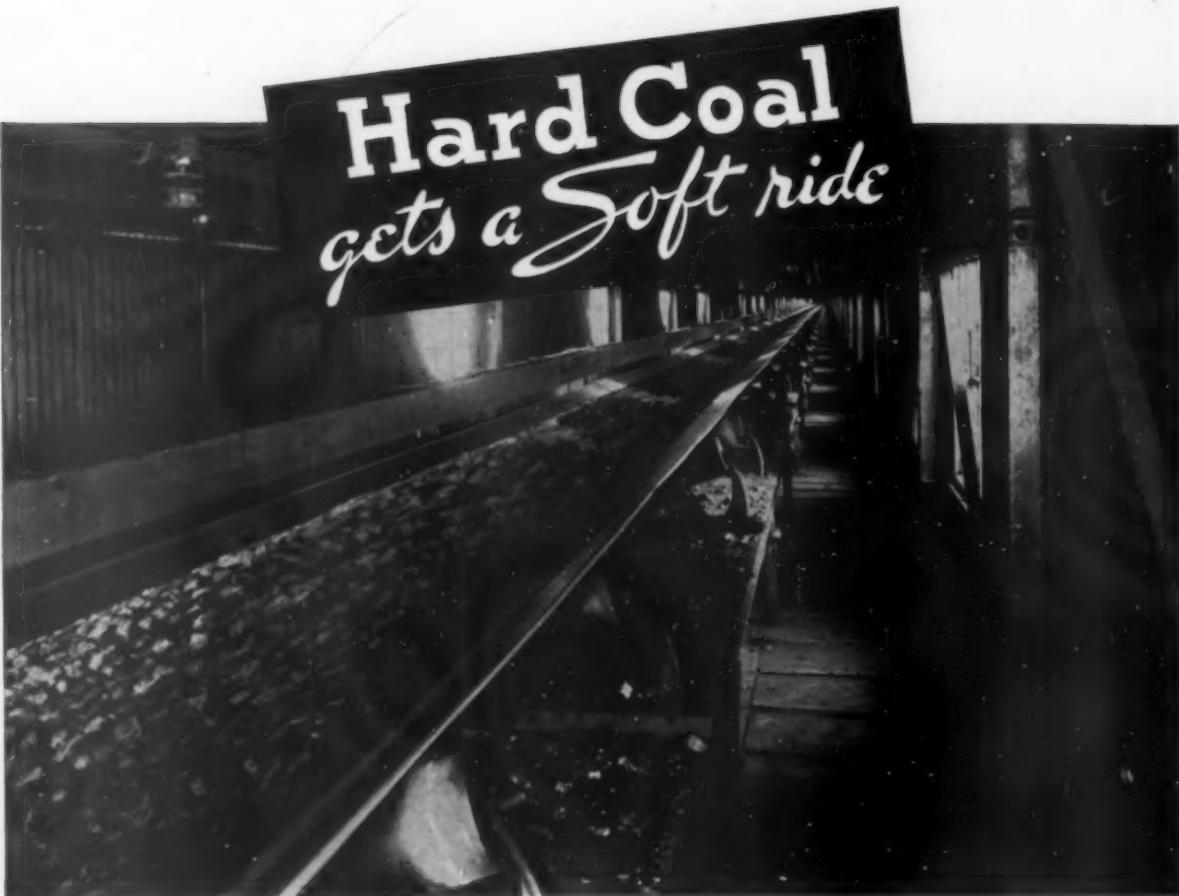
THE NATIONAL SUPPLY COMPANY  
OF DELAWARE

SUPERIOR ENGINE DIVISION

LOS ANGELES, CALIFORNIA SPRINGFIELD, OHIO PHILADELPHIA, P.A.

# Superior DIESELS

HEAVY DUTY MODELS: 50 to 810 H.P., 250 to 720 R.P.M. • HIGH SPEED MODELS: 25 to 150 H.P., 1200 to 1800 R.P.M.



Thermoid offers a complete line of beltings including the following standard types

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- Transmission Belting
- Grader Belting
- Canners Belting
- Bucket Elevator Belting
- Grain Elevator Belting
- Agricultural Belting
- Hog Scraper Belting
- Endless Thresher Belting
- Oil Country Belting
- Axle Lighting Belting

For more detailed information on Thermoid Industrial Rubber Products, refer to Sweet's Catalog File.

Coal is given a long, easy ride at the Dorrance Colliery of the Lehigh Valley Coal Co., Wilkes-Barre, Pa. Here is a 7-ply conveyor belt, 630 feet long and 43 inches wide, which daily carries hundreds of tons with little sign of abrasion or wear.

It's knowing *how* and *why* that enables Thermoid to build products that do the job, no matter how tough, and do it well. Thermoid has learned *how* in the factory and *why* in the field during 56 years of hard-earned experience. Why not give Thermoid products a chance to prove how well they can do your particular job? Your supply house can deliver them promptly, and our engineers are always at your service in solving unusual problems.

**Thermoid Rubber**  
*Division of Thermoid Co.*  
**TRENTON, NEW JERSEY**

# Thermoid

**BELTING • HOSE • PACKINGS • BRAKE LININGS**



# Crushing WET ORE CONTAINING CLAY AND TALC

To develop their Comet Mine, the Basin-Montana Tunnel Co. of Basin, Montana, after the most careful investigation, selected Telsmith crushing equipment. Operation, begun early in 1934, has been continuous. The mill is now operating at 200 tons per day, with an ample margin of surplus crushing capacity.

The metals mined are zinc, lead, silver and copper, with some gold. Ore is very hard and abrasive. Much of the rock is wet, containing clay and talc, making a difficult crushing problem.

Ore from the mine first passes through a 9" x 30" Telsmith-Wheeling Roller Bearing Jaw Crusher and is crushed to about minus 1½". Then it is conveyed to a 2' x 6' Telsmith Single Deck Pulsator, with ¾" square openings in screen cloth. Oversize from this vibrating screen goes to a No. 24 Telsmith GyraspHERE Crusher originally set to deliver minus ½", now minus ¾" product. According

to the management this GyraspHERE has given excellent service . . . crushing from 5700 to 11,000 tons of ore with one set of manganese wearing parts, this wide variation being due to the change in adjustment. Oiling system is positive, without dust seal failures. Repair expense is moderate; mechanical performance has been satisfactory; and power consumption low. The Basin-Montana people report, "We like Telsmith equipment."

*Write for descriptive Bulletins—Y-11 Telsmith GyraspHERE Crusher; W-11 Telsmith-Wheeling Jaw Crusher; V-11 Telsmith Pulsator.*

#### TRAMP IRON DOES NOT STOP TELSMITH

*Actual photograph of tramp iron which passed through both Telsmith jaw Crusher and GyraspHERE Crusher in plant of Basin-Montana Co., yet failed to damage either crusher in any way.*



**SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE, WIS.**

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M-5-C

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# TELSMITH

# RAYMOND ROLLER MILL.

## PERFORMANCE

Continuous new developments in Raymond equipment are leading the way to higher capacity per unit, and lower cost per ton of material produced. In a recent installation for grinding gypsum, operating figures show that a decided improvement is obtained in output by the use of the latest type of Raymond Four Roller Low Side Mill. Two grades of gypsum are pulverized: one is the fines from crushed gypsum; the other is the coarse crushed rock with fines removed. Note these comparative results:

Performance	New Roller Mill	Old Equipment
On Fine Screenings.....	19 Tons per Hour	13
On the Pebble Rock.....	17 Tons per Hour	12

The new Raymond Mill showed an average increase of 44% in output over the former mill in making a finished 100-mesh product.



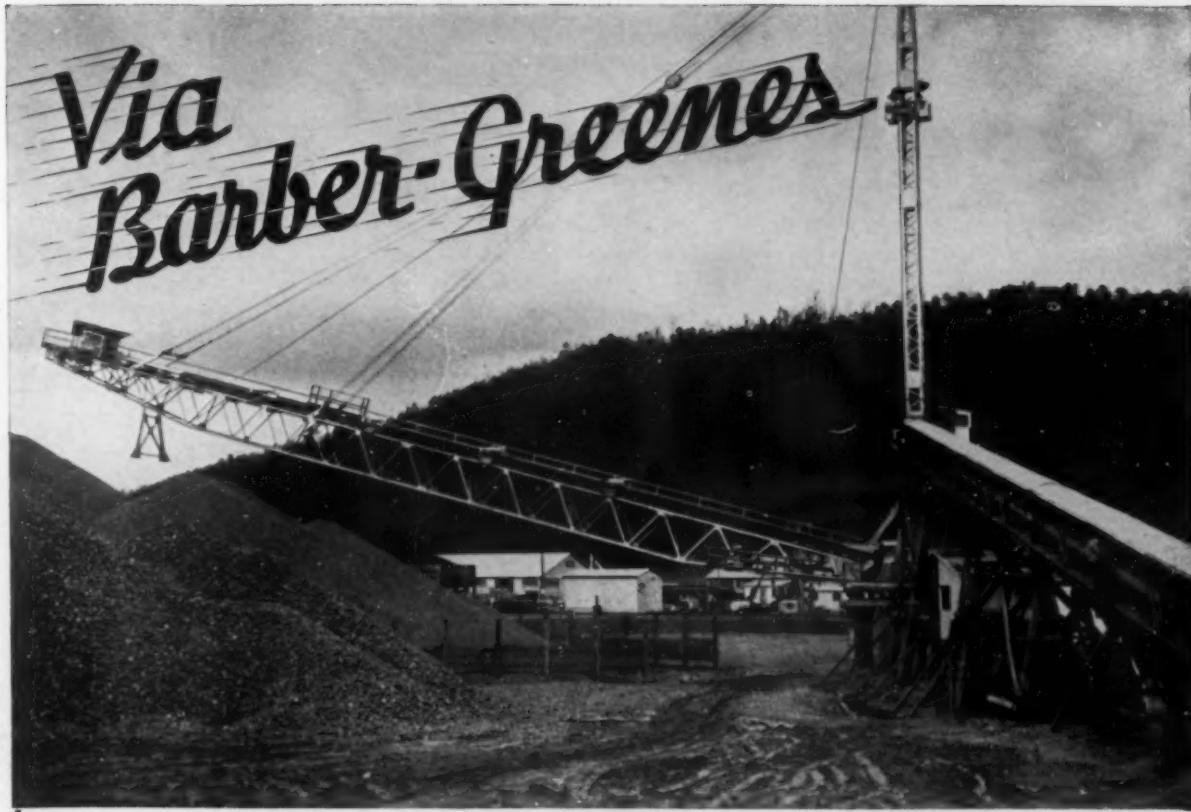
# RAYMOND

Typical Raymond Roller Mill . . .  
Low Side Type . . . equipped with  
Air Separation.

For low cost grinding of gypsum,  
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tallic minerals. Catalog on request.

**PULVERIZER DIVISION**  
Combustion Engineering Co., Inc.  
1307 North Branch Street, Chicago

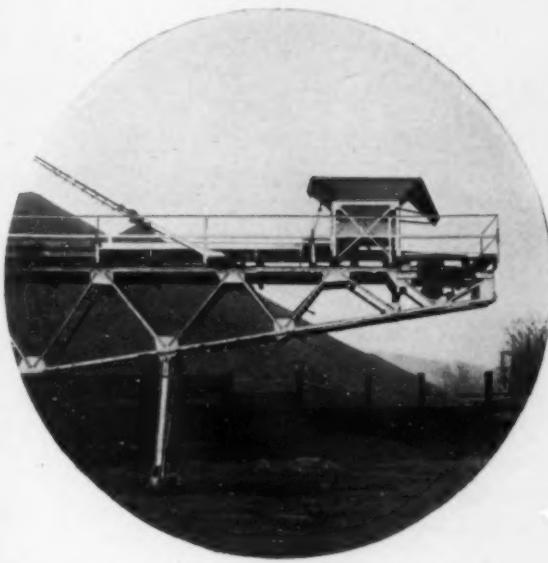
Sales Offices in Principal Cities  
Canadian Rep.: Combustion Engineering  
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"VIA BARBER-GREENES" means more than a make of machine. It not only means the most efficient solution to a material handling problem, it frequently means engineering ingenuity which has so indelibly marked Barber-Greene installations throughout the country.

The aggregates at the Guntersville, T.V.A. job, are handled over 1,400' of Barber-Greene Conveyors, but we particularly call your attention here to one 160' unit, the B-G Radial Stacker shown above. This Stacker receives sand and gravel from the Barber-Greene Permanent shown on the right, and stores it into five compartments through an arc of 300°. The stacker is raised, lowered, and swiveled by power. When the material is to be reclaimed for storage in the aggregate bins, the stacker is lowered to the ground as shown at the left, and a clamshell picks up and discharges the material into the hopper on the head end of the stacker. The belt is reversed for this operation, takes the material back to the tail end, and discharges it onto another Barber-Greene that fills the aggregate bins.

Regardless of how simple or complex your material handling problem is, you can't lose by asking for a Barber-Greene solution—and you'll probably gain.



Portable Conveyors—Permanent  
Conveyors  
Stackers—Loaders—Ditchers  
Representatives in Principal Cities

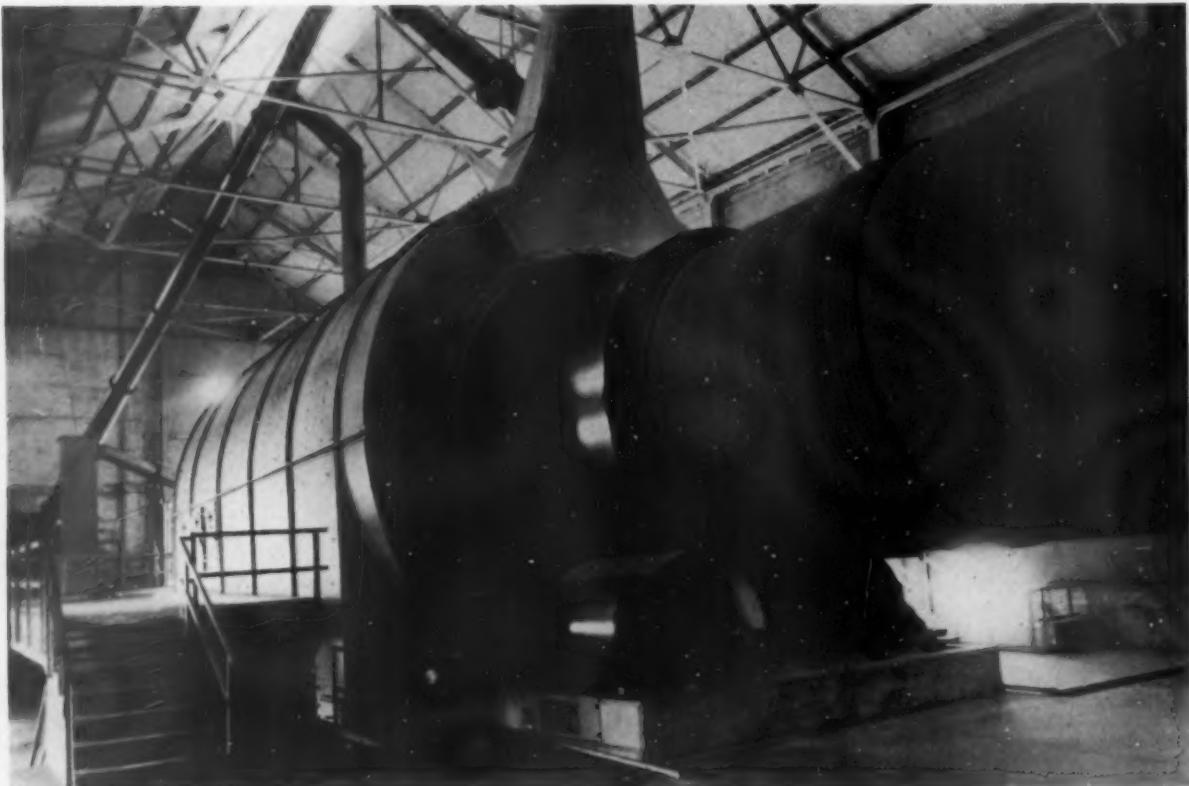
Standardized Material  
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**BARBER  
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459 West Park Ave.,  
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37-8

# UNAX GRATE COOLER FOR ROTARY KILNS

AIR QUENCHING TYPE INTEGRAL WITH KILN



THE UNAX GRATE COOLER consists of two parts: one stationary, one revolving. The stationary part comprises a casing surrounding the outlet end of the kiln and containing a stationary grate. The revolving part consists mainly of conveying flights and scoops attached to and rotating with the kiln, spreading the clinker evenly over the grate, through which cooling air is passed. The heated air is used for combustion in the kiln.

## ADVANTAGES

Rapid, efficient cooling of product. Increase in fuel economy of the kiln.  
Increase in grindability of clinker. Improvement in quality of the cement.  
Low first cost, low maintenance cost.

The longest kilns in the world (512' and 520') are equipped with these Unax Grate Coolers.

**F. L. SMITH & Co.**

225 BROADWAY

Engineer Specialists in Designing and  
Equipping Cement Making Factories

NEW YORK, N. Y.

# Roebling... The pacemaker in wire rope development

**T**HE most exacting basis for judging wire rope performance is **AVERAGE SERVICE**.

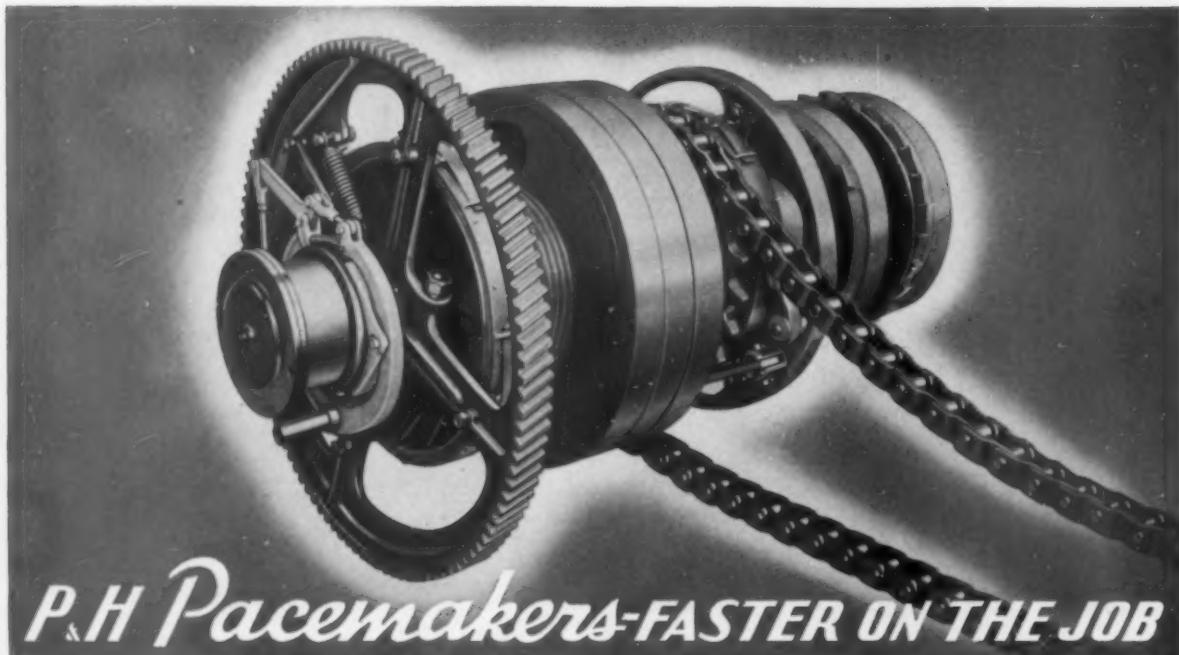
This is the basis advocated by Roebling, in which rope cost per mile of elevator travel or per other unit of service measurement, is based not on the service of a single rope but on the average service of several ropes.





"Our  $\frac{3}{4}$  yd. P&H has dug and loaded as much as 700 yds. per day . . . better production than most  $\frac{3}{4}$  and  $\frac{1}{2}$  yd. shovels in this territory" — J. F. Carter, County Road Supervisor, Abbeville, Alabama.

# Why P&H's CHAIN CROWD is Better



**P&H Pacemakers-FASTER ON THE JOB**

1. Rapid reversing planetary with positive chain — returns dipper at 150% of crowding speed.
2. Permits shorter boom—less weight, less counterweight—less waste of power.
3. Accuracy to dig within 1 inch of grade.
4. More economical—P&H crowd chain lasts from 3 to 5 years.

P&H patented the rapid reversing planetary with positive chain crowd—perfected its use. Its most advanced application is found on all P&H Pacemakers—built by the Harnischfeger Corporation.

4465 West National Avenue Milwaukee, Wisconsin

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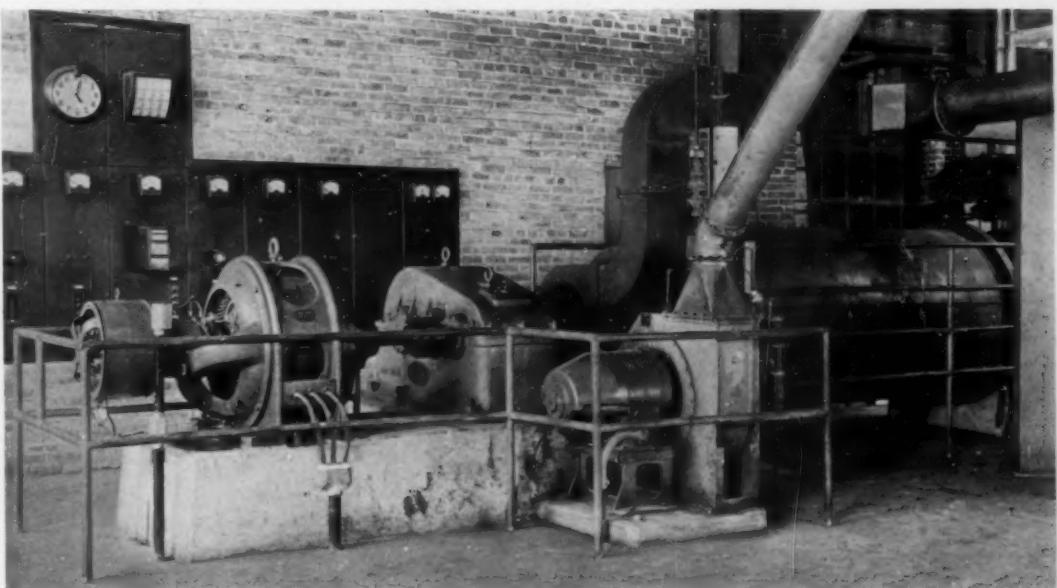
EXCAVATORS • ELECTRIC CRANES



HOISTS • MOTORS • ARC WELDERS

Again  
a K. V. S. Air-Swept  
Tube Mill

SUPPLYING  
AIR-FLOATED SUPER-  
FINE PULVERIZED COAL  
TO THE WORLD'S LONGEST LIME KILN



The success of firing the 400' kiln at the Bellefonte, Pa., plant of the Chemical Lime Co. is due to the Air-Swept Tube Mill shown above producing a flame approximately 190' long, and due to the K.V.S. organization putting the system into satisfactory operation.

Because of their performance and low maintenance records K.V.S. Mills are also used in the same plant for pulverizing lime and limestone.

**CONSULT US FOR MAKING BETTER  
PULVERIZED PRODUCTS AT LOWER COSTS**

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**KENNEDY-VAN SAUN**

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NEW YORK CITY

APRIL, 1937

When writing advertisers, please mention **ROCK PRODUCTS**

19

# Cement Clinker Cuts like Emery .....but CABLE Not Worn At All

*This writes William Fowden, Plant Manager of The South Dakota Cement Plant, Rapid City, S. D.*

Part of Mr. Fowden's letter is as follows:

"... and I am more than satisfied with the cable we are using on our electric shovel and electric yard crane. It is pulled around in a pile of cement clinkers which has almost the cutting properties of emery. As yet we have not had any trouble with the cable, and cannot see that it has worn at all."

## Four Years' Service

This cable is a G-E tellurium-cured all-rubber type, three-conductor, No. 2 Awg.

It was installed in January, 1932, and when a G-E representative examined it on October 16, 1936, he found little signs of wear, despite this nearly four years of hard service. It was once run over by a 75-ton steam locomotive, and the jacket was somewhat damaged, but a simple jacket repair put it back in service.



## Tellurium-cured

The jacket on this G-E portable cable is cured or vulcanized by a special G-E process, using the element tellurium. The process results in a protective covering that is not only tough and capable of resisting abrasion, but which is also long aging and able to withstand the rays of the sun.

## A Type for Every Use

You can get this G-E portable cable in every type



*A visitor closely examines the G-E Type W three-conductor tellurium-rubber cable, in use at the South Dakota Cement Plant, and can find no signs of wear*

and size, one of which is best suited for a coal-cutting, loading, or conveying machine—for an electric shovel, crane, hoist, or dredge—for a portable motor or compressor—for an arc-welding machine—in fact, for every kind of portable electric equipment.

May we send you a copy of our Bulletins GEA-1728 and GEA-1918, which give prices and specifications? Address nearest G-E sales office, or General Electric, Dept. 6C-201, Schenectady, N. Y.

*Trade Mark of the South Dakota Cement Plant, which is located in Rapid City, S. D.*



520-106

# GENERAL ELECTRIC

THEY STARTED WITH 1 AND  
NOW HAVE 3 REX MOTO-MIXERS  
DELIVERING READY-MIXED CONCRETE  
in a town of 35,000



*The Three Rex Moto-Mixers of the Certified Concrete Company of Green Bay*

Good business always watches for a profitable change. In 1935 the Duck Creek Quarry Company of Green Bay, Wis., didn't wait to see their sand, gravel, stone and cement business begin to fade away. They acted; they organized the Certified Concrete Company of Green Bay; bought one Rex Moto-Mixer and began to deliver ready-mixed concrete.

Today, in this community of 35,000 people, they are operating three Rex Moto-Mixers to supply the increasing demand for ready-mixed concrete. Their experience showed that Rex Moto-Mixers and Agitators actually mix and deliver sand, gravel, stone and cement the easiest and most profitable way.

You, too, can protect your business and get bigger and quicker profits from your sand, gravel, stone and cement by mixing and delivering ready-mixed concrete with Rex Moto-Mixers and Agitators. Investigate this proved path to quick profits; send for the free book, "Rex Moto-Mixers and Agitators." It tells you *how* to do it.

**CHAIN BELT COMPANY  
OF MILWAUKEE**



*Moto-Mixers*



**READY-MIXED CONCRETE**

Send today for a copy of the book—"Rex Moto-Mixers and Agitators." It describes the modern way to secure the profitable method of selling cement and aggregates. It illustrates the modern Rex Moto-Mixer features.

**CHAIN BELT COMPANY**  
1649 W. Bruce Street Milwaukee, Wis.





The Type 1001-A dragline is not just another excavator adapted to dragline work. Right from the start it was designed as an efficient, wide range machine embodying certain exclusive LIMA features which make dragline work more profitable.

Operators like its ease of operation and the way it handles long booms at low angles. Contractors like its economical and trouble-free performance. A LIMA Type 1001-A dragline is your assurance of long, profitable and efficient service.

Write for a copy of bulletin No. 11-A.

SHOVELS — DRAGLINES — CRANES — CLAMSHELLS

# Big or Little . . .

THEY'RE TOUGH!



LORAIN Grinding Balls are tough. They're tough because they are forged from Carnegie-Illinois Controlled Steel and passed through a heat treating process which assures uniformity in size and roundness.

Forging helps to give Lorain Grinding Balls the quality which is necessary for even grinding action and, combined with their normal toughness, makes them last longer. Lorain Grinding Balls are carefully inspected

to be sure that they meet the standard of quality which this product maintains.

As the uniformity of your own product depends upon the choice of good raw materials, so does the high quality of forged Lorain Balls result from the use of best materials. Likewise, lowest operating costs in your production can best be maintained by employing the consistently uniform wearing characteristics of Lor-

ain Balls in your grinding processes.

Specify Lorain Grinding Balls. They are available in the following diameters:  $\frac{1}{2}$ ",  $\frac{3}{4}$ ",  $\frac{5}{8}$ ",  $\frac{7}{8}$ ", 1",  $1\frac{1}{4}$ ",  $1\frac{1}{2}$ ", 2",  $2\frac{1}{2}$ ", 3",  $3\frac{1}{2}$ ", 4",  $4\frac{1}{2}$ ", and 5".

#### OTHER LORAIN PRODUCTS

Mill Liners and Screens of High Carbon Rolled Plate, Manganese, Chrome Nickel, Chrome Nickel Molybdenum, and plain Carbon Steel or Hard Iron; Hammers for Swing Hammer Mills, Industrial Cars, and Trackwork.

## U·S·S LORAIN GRINDING BALLS

CARNEGIE-ILLINOIS STEEL CORPORATION

Lorain Division

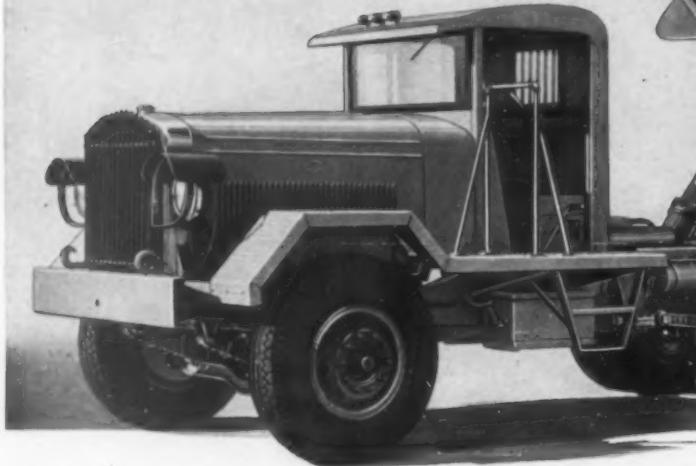
Johnstown, Pa.

Columbia Steel Company, San Francisco, Pacific Coast Distributors



United States Steel Products Company, New York, Export Distributors

# UNITED STATES STEEL



Model 99 Hug Quarry Special. Designed for heavy duty quarry service; with 10-yard Hug Quarry Body—36,000 lbs. pay load capacity.

## HEAVY DUTY HAULING DEMANDS REAL HEAVY DUTY EQUIPMENT

Contractors, quarry operators, dirt movers, in fact the entire field of heavy dump truck movers, recognize the superior features of Hug transportation equipment, because Hug offers a *real heavy duty transportation unit*.

Hugs are built throughout with extra heavy duty truck units, including massive arc welded I-beam frames, powerful heavy duty truck engines, rugged axles, transmissions, and springs. All the way through, Hugs are completely designed to operate profitably on the toughest jobs.

Hug Roadbuilder chassis and dump bodies are engineered and built as a completely balanced, integral unit. This heavy duty construction, balanced load distribution, short wheel base and turning radius together with Hug special features of design puts Hug in a heavy duty hauling class by itself.

Bring your transportation problems to Hug, for whatever your requirements there is a Hug unit that will lick them profitably. Let Hug engineers show you *why* the superior transportation features of Hug Roadbuilders will greatly reduce your hauling costs.

**THE HUG COMPANY**

502 Cypress Street

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**BUILT TO MEET A CONDITION**



Model 87Q Hug Roadbuilder. Equipped with 6-yard Hug Scoop End Body and high dumping angle hoist, especially engineered for dirt and rock hauling.



Model 87Q Hug Roadbuilder. With 6-yard Easton Phoenix Side Dumping Quarry Body. Designed particularly for quarry service.



Model 97L Hug Roadbuilder. Equipped with 8-yard Hug Rock Body and down folding tail gate—for dirt and quarry operations.



TRY Kable Kord on your tough jobs. Make it take it, and you'll see plenty. Kable Kord buckles down and licks the troubles that lick other flat belts. They don't come any tougher than Kable Kord... Gilmer builds it brute-strong. Kable Kord is really two-belts-in-one: a power belt *plus* a contactor belt. Patented improvements created by Gilmer, make it hug flat pulleys with a snugger, no-slip grip that delivers maximum pull per square-inch. So what? So you save money!

**FREE**  
**KABLE KORD DATA BOOK**

Tough, true talk about Kable Kord. Undoctored laboratory tests and fair factory competition prove that Kable Kord claims are facts. Find out the reasons why. Send for your copy today.

**L. H. GILMER COMPANY, Tacony, Philadelphia**

# UTAH

## Positive Electro Magnetic Vibrating Screen



THE UTAH Electro-Magnetic Vibrating Screen was developed about four years ago and since then about fifty units have been put in service. It is a new type of screen, with very low power consumption (0.4 to 0.7 kw for a 4'x6' screen). Dual magnets, supplied with current from a small bank of copper oxide rectifiers which splits the alternating current wave, give equal and positive motion in opposite directions.

*Complete information on these new screens is given in Leaflet 2247. Why not write for your copy now?*

751



# Now...DECK-LOADING EASIER



## with NEW PRIMER for "NITRAMON"

THE new "side" primer at the left may be used with Cordeau for either solid column or deck-loading. With this type of primer, it is now possible to detonate several primers in a broken column with a single line of Cordeau. The can has a fluted tube soldered to the side adjacent to the T.N.T. charge through which the Cordeau is threaded.

This improvement is just another of the many reasons why more and more quarries are using NITRAMON. This safer blasting agent has proved its ability to give lower costs per ton of rock moved. That's why such a large part of the 100% increase in the use of NITRAMON in 1936 came from satisfied customers' repeat orders.

### 2 OTHER "NITRAMON" PRIMER IMPROVEMENTS



In the Top Type Primer, the priming portion consists of a horizontal tube passing through the small can attached on the top of the primer can. There are cleats and guides at the end of this tube to allow the use of both E. B. Caps and Cordeau.



The Two-Tube Type Primer is a modification of the original E. B. Cap type of primer, for use with E. B. Caps only. 2 vertical tubes extend into the T.N.T. charge as in the original primer, except that these tubes are cut off at the cleat. This removes the possibility of short circuiting the E. B. Cap wires by the sharp tube edge.



E. I. DU PONT DE NEMOURS & COMPANY, INC., EXPLOSIVES DEPARTMENT, WILMINGTON, DEL.

# NITRAMON

REG. U. S. PAT. OFF.  
THE APPROVED BLASTING MATERIAL



In practically every country throughout the world where fine crushing is done in quantity, Symons Cone Crushers will be found. Their rapidly growing and widespread use is proof that these crushers live up to the claims

made for them. The Standard Type for ordinary reduction crushing and the Short Head for even finer crushing are without equal in providing the growing quantities of such finely crushed materials as are required today.

If finer crushing is being considered, or if greater capacity is desired, let us show you what Symons Cones will do. Write us about your fine crushing problem.

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# SYMONS CONE CRUSHERS

# NOW-

# Another NEW NORTHWEST

MODEL 15  
3/8 YARD  
CAPACITY

MODEL 18  
1/2 YARD  
CAPACITY

MODEL 25  
3/4 YARD  
CAPACITY

## A NORTHWEST MACHINE TO MEET EVERY CONDITION

The New Northwest Model 20, 5/8 yd. Northwest shovel is the last word in machines of this capacity. Now there is a Northwest machine for every class of work—3/8 yd. capacity and larger.

The New Model 20 has a full cab with space all the way 'round the operating machinery. Bases are cast steel and machinery side frames are cast integrally with the rotating base, assuring positive and permanent alignment of shafting. Ball and roller bearings on all high speed shafts, "feather-touch" control, cushion clutch, helical gear drive, self-cleaning treads, cone clutches, demountable lagging, are but a few of its many advantages.

Don't buy a machine of this capacity without getting full information on the Model 20.

Built  
in a range  
of 18 SIZES  
3/8 yd. capacity  
and  
Larger

GASOLINE  
•  
ELECTRIC  
•  
DIESEL  
•  
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SHOVEL . . . . .  
CRANE . . . . .  
DRAGLINE . . . . .  
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TRUCK CRANE . . . . .



**NORTHWEST ENGINEERING CO.**

*The world's largest exclusive builders of gasoline, oil, diesel or electric powered shovels, cranes, draglines, pullshovels and shimmers*

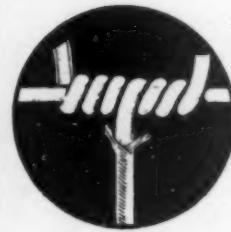
1729 Steger Building, 28 E. Jackson Boulevard, Chicago, Ill.

# NORTHWEST



## SPECIFY CORDEAU for Lower Operating Costs

Portion of quarries, Marquette Cement Mfg. Co., Cape Girardeau, Mo.



A large cement producer in the Middle West, the Marquette Cement Mfg. Company, specifies Cordeau-Bickford Detonating Fuse for efficient blasting. Large shots are made at the Cape Girardeau, Mo., plant, a section of which is shown in the photograph above.

Blasting economy is realized here because detonation with Cordeau permits planned split-second rotation—proper relief of burden. This results in better fragmentation—easier removal. Cordeau allows fewer and bigger shots because it connects all holes

and detonates each charge with the force of a primer cartridge. Every pound of explosive used gives maximum power.

Cordeau-Bickford Detonating Fuse is insensitive to ordinary shocks, and must be detonated.

Cordeau-Bickford Detonating Fuse is manufactured with the same precision that has made Ensign-Bickford Safety Fuse famous for more than 100 years. Send for a copy of the Cordeau Book. It contains interesting important instructions and data.

### CORDEAU-BICKFORD DETONATING FUSE

THE ENSIGN-BICKFORD COMPANY, SIMSBURY, CONN.

MAKERS OF ENSIGN-BICKFORD SAFETY FUSE SINCE 1836

CR-5

# IT'S NEW - IT'S FREE

*Gravel  
AND  
Rock*

**CRUSHING AND  
SCREENING  
EQUIPMENT**  
BY . PIONEER

In this Catalog we have endeavored to present by illustration and description the correct application of the various type of rock crushing, screening and gravel handling equipment.

Three types of screens are discussed — the advantages of each are enumerated.

The advantages and limitations of the Jaw and Roll Crushers are explained.

Various types and sizes of gravel plants, quarry plants and washing plants are shown.

Every commercial producer, every portable producer, contractor, or official who is interested in the production of rock, gravel, sand, or aggregate should have a copy of this Catalog.

*Send the coupon for your copy today.*

**IT TELLS -**

**WHEN** to use the Horizontal Gradation Screen

**WHERE** to use the Portable Crusher

**HOW** to use the Portable Stabilizer Plant

**WHY** to use the Roll Reduction Crusher

Here, under one cover, is the answer to your aggregate producing problem!

PIONEER GRAVEL EQUIP. MFG. CO.  
1511 Central Avenue  
Minneapolis, Minn.

Please send me ..... copies of "Gravel and Rock" to complete my files with latest available data on best practices in this work.

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ADDRESS .....

# KOEHRING

# DUMPTOR



## HEAVY DUTY

— construction of Koehring Dumptors withstands the abuse of continuous hard service under rough hauling conditions. Full loads of rock were easily loaded, speedily hauled, and quickly dumped on this tough rock excavation job.



**KOEHRING COMPANY**  
Pavers - Mixers - Shovels - Cranes - Draglines - Dumptors - Mud-Jacks  
3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

# WHEN YOUR MACHINE WAS JUST A PIECE OF PAPER

Its Lubrication was as carefully planned as its size, weight and balance...and the chances are 4 to 1 that Socony-Vacuum Lubricants were approved for its use!



WHEN THE MACHINES in your plant are planned ...chances are that Socony-Vacuum engineers "sit-in." And very likely Gargoyle Lubricants are recommended for their efficient lubrication.

Here are good reasons why 80% of America's machinery builders approve the oils and greases trade-marked with the Red Gargoyle: they offer

power savings, decreased maintenance, improved production, lower annual oil bills.

110 different industries—standardize on Gargoyle Lubricants. Their reasons: better machine efficiency and savings in plant operating costs.

Encourage your staff to cooperate with Socony-Vacuum engineers. You will find it profitable.

## SOCONY-VACUUM INDUSTRIAL LUBRICATION



SAVES  
MONEY  
FOR  
INDUSTRY

Read what 71 Years' Lubricating Experience...the Greatest in the Oil Business...can do for You. See Next Page.

# THIS MARKETING POLICY MEANS "CORRECT LUBRICATION" FOR EVERY TYPE OF PLANT

INDUSTRY ALMOST ALWAYS FINDS that the controlled use of high-grade Gargoyle Lubricants pays for itself many times over and that they actually cost less to use than ordinary lubricants.

But, for such equipment as does not justify the highest-grade lubricants, Socony-Vacuum Engineers will always recommend a lower-priced lubricant when consistent with true economy.

Socony-Vacuum, with a complete line of products, can supply the lubricants best fitted for the requirements of the individual lubricating job as determined by specific operating conditions.

Socony-Vacuum Engineers bring you years of world-wide experience and direct cooperation with manufacturers of equipment. Lubrication Profit is the inevitable result.



SEND FOR THE SOCONY-VACUUM REPRESENTATIVE: *The services of a trained Socony-Vacuum Engineer are available at all times in helping your men to solve lubrication problems.*

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STANDARD OIL OF NEW YORK DIVISION · WHITE STAR DIVISION · LUBRITE DIVISION · WHITE EAGLE DIVISION  
WADHAMS OIL COMPANY · MAGNOLIA PETROLEUM COMPANY · GENERAL PETROLEUM CORPORATION OF CALIFORNIA



# But...



what have HERCOMITE and GELAMITE  
to do with a Streamlined Train?

All are modern...and give you more for your money

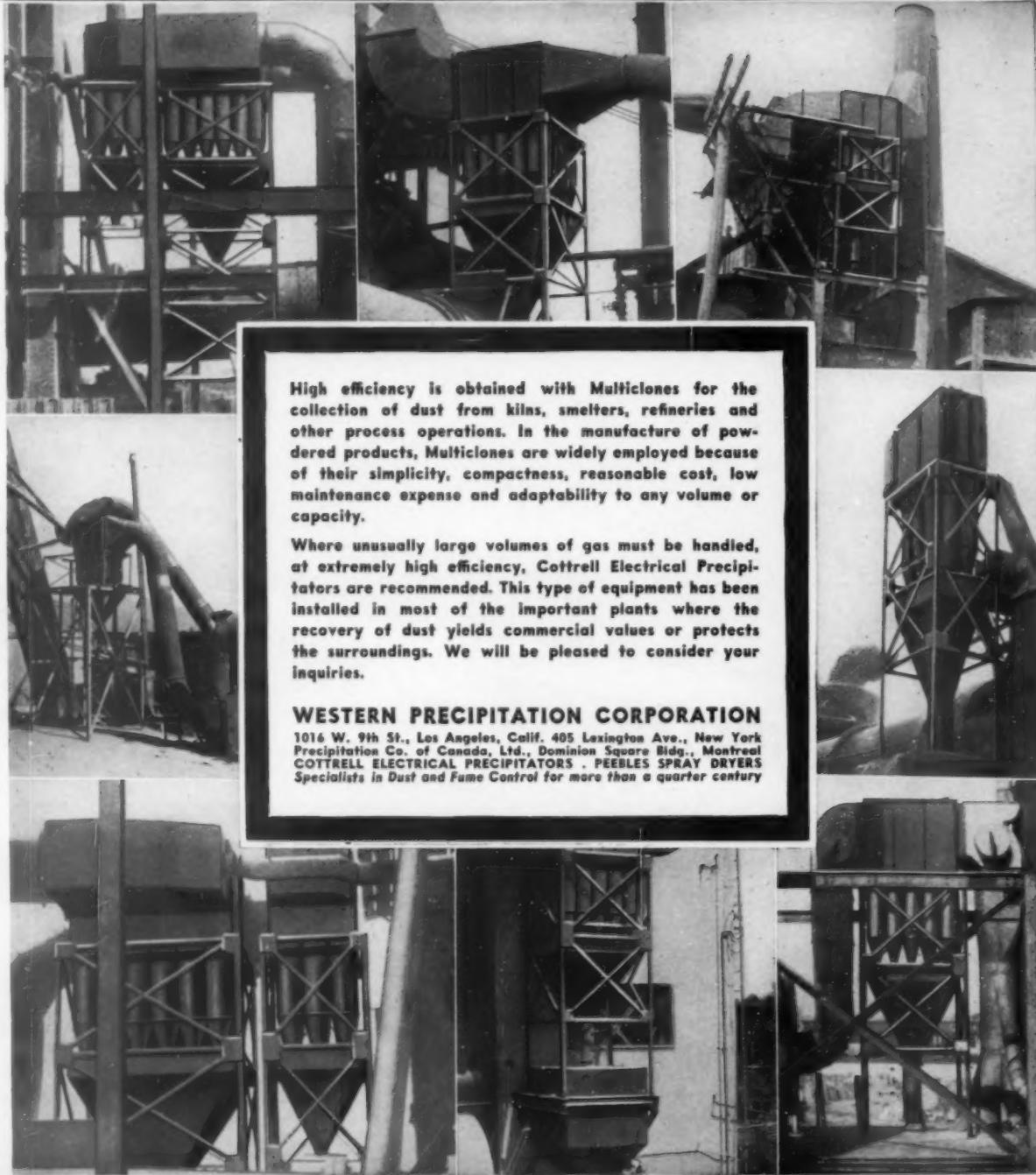
Economy is important. That's one reason why streamlined trains are replacing older types. " " And that's why Gelamite and Hercomite are rapidly replacing older types of explosives for metal mining, construction, quarrying, and all-round blasting. " " HERCOMITE, for example, usually saves from 6% to 24% in explosives costs: like the streamlined train, it is a great value. " " GELAMITE, too, is geared to modern needs. For most work it can replace gelatin. And this replacement usually means about a 10% to 15% reduction in explosives costs. " " Just as the streamlined train is revolutionizing railroading, so Hercomite and Gelamite are revolutionizing blasting.

HERCULES POWDER COMPANY  
948 KING STREET, WILMINGTON, DELAWARE  
INCORPORATED

A-60



# PROCESS DUSTS



High efficiency is obtained with Multiclones for the collection of dust from kilns, smelters, refineries and other process operations. In the manufacture of powdered products, Multiclones are widely employed because of their simplicity, compactness, reasonable cost, low maintenance expense and adaptability to any volume or capacity.

Where unusually large volumes of gas must be handled, at extremely high efficiency, Cottrell Electrical Precipitators are recommended. This type of equipment has been installed in most of the important plants where the recovery of dust yields commercial values or protects the surroundings. We will be pleased to consider your inquiries.

#### WESTERN PRECIPITATION CORPORATION

1016 W. 9th St., Los Angeles, Calif. 405 Lexington Ave., New York  
Precipitation Co. of Canada, Ltd., Dominion Square Bldg., Montreal  
COTTRELL ELECTRICAL PRECIPITATORS - PEBBLES SPRAY DRYERS  
Specialists in Dust and Fume Control for more than a quarter century

# MULTICLONE



**"THAT *Cleveland* WILL PUT THIS STEEL DOWN TO GRADE"**



When the going is especially tough—the ground variable, broken, and full of mud seams—when just a foot or so more in each drilled hole would take you down to grade—what a satisfaction it is to have rock drills on the job that can always be counted upon to rotate the steel, even when the gage is worn, and to clean the holes, however heavily muddled they may be!

Cleveland Rock Drills—whether the hand-held type or wagon rigs—will save you money on rock removal. Bulletin 110 contains the essential information, boiled down to suit the man who is too busy to read anything but facts.

★ Cleveland H7, H11 and H77 sinkers are winners all—each in its class. The Model H11, illustrated, primarily designed as a hard rock machine, is equally efficient in soft and medium formations. It is always a pleasure to demonstrate.

**THE CLEVELAND ROCK DRILL COMPANY**

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**LEADERS IN DRILLING EQUIPMENT**



now...

*the*  
"Sunshine Process"  
(ADDITION OF VITAMIN D)

makes good  
**Bread and  
Milk  
BETTER**

now...

*the Preforming Process*  
makes good **Wire Rope BETTER**

• The addition of Vitamin D concentrate gives food the life-giving value of sunshine. A basic improvement to an age-old product.

Preforming gives wire rope the life-giving value of relaxation. A basic improvement to a century-old product.

Preforming relaxes wire rope. It puts all component wires and strands in a state of ease. They are comfortable, unstrained, flexible. Preforming thereby tends to eliminate

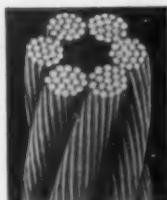
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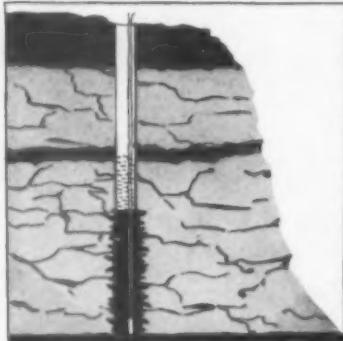
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It doesn't take a  
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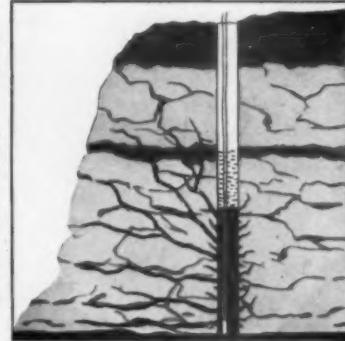
Atlas Apex is available in *three* strengths, each strength in *three* velocities— $3 \times 3$  equal *nine* combinations of speed and strength to suit your rock formation. Add the *plus* factor of Apexaction and you have the *complete answer* to a great majority of quarry blasting problems.



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**ATLAS**  
EXPLOSIVES





# DO YOU KNOW...

A half century ago Jeffrey originated and patented certain fundamental chain designs. From these were manufactured the first all steel drive and conveyor chains with rollers turning on thimbles locked in the side bars and with pins articulating in the thimbles. For this original invention the U. S. Patent Office on November 29, 1887, granted Patent No. 373,983 on "Chain and Chain-Making" . . . to Joseph Andrew Jeffrey, founder of the Jeffrey Manufacturing Company.

These chains, which Jeffrey expressively names the **STEEL THIMBLE ROLLER** type . . . STR for short . . . have survived the tremendous changes in power transmission and conveying ideas of industry during the past 50 years. Maximum strength and minimum weight, with renewable parts make their use a real economy.

When you have need for such chains  
... call on Jeffrey, their originator.

*The* **Jeffrey Mfg. Co.**

**Columbus, Ohio**  
Sales Offices in Principal Cities

60  
years  
1937

Reproduced below is the Steel Thimble Roller Chain for which the original patent was granted.

UNITED STATES PATENT OFFICE

JOSEPH A. JEFFREY, OF COLUMBUS, OHIO

## CHAIN AND CHAIN-MAKING.

**SPECIFICATION forming part of Letters Patent No. 373,983, dated Nov. 20, 1923.**

To all whom it may concern:

Be it known that I, JOSEPH A. JEFFREY, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Chain and Chain Making, of which the following is a specification, reference being had thereto to the accompanying

10. Figure 1 is a face view of a strip of steel, wrought iron, or other suitable metal, from which may be cut and adapted for use on improved frames. Fig. 2 is an edge view of Fig. 1. Fig. 3 is a view of one of the finished side bars. Fig. 4 is a section of Fig. 3. Fig. 5 is an edge view of Fig. 3. Fig. 6 is a plan view of two of the bars in position. Fig. 7 is a side view of a tube from which can be cut thumb-screws or thumb-end bars. Fig. 8 shows thumb-screws ready for insertion. Fig. 9 is a plan view of a link after the parts have been

After these thimbles are  
they are inserted in the  
fastened by riveting on  
the points B B  
getting.

At r, I have shown a dry  
the notch or key so  
there may be a corre  
end of the thumbile.  
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bars are provided  
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or key-seals of.  
E is the pivot  
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provided.



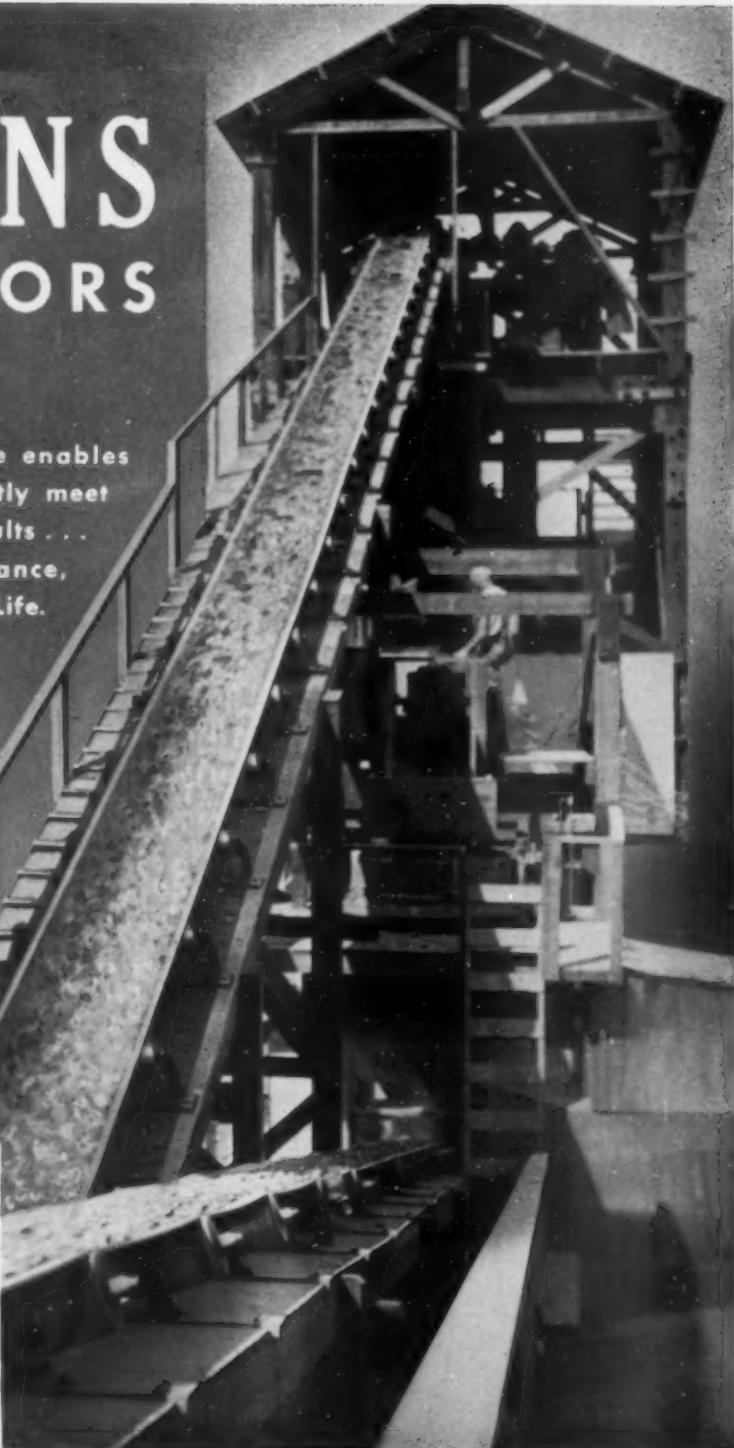
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Completeness of the line enables Robins Engineers to exactly meet the job requirements. Results . . .  
**Low Power and Maintenance,  
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No plant too large or too small to enjoy the benefits of Robins Service. Offices and representatives in the principal cities throughout the world.

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MATERIAL HANDLING  
**ROBINS**  
EQUIPMENT

SEND FOR DESCRIPTIVE BULLETINS

# .Rock Products

Volume 40

Chicago, April, 1937

No. 4

## TRENDS REVIEWED BY THE EDITOR

Rising  
Wages,  
Costs,  
Prices

Signing of contracts between the United States Steel Corporation and the C. I. O. union of steel workers has been followed by, or at least accompanied by, increases in wages in many rock products organizations. These were anticipated last December, as reference to the

returns from ROCK PRODUCTS annual questionnaire will prove (summarized in the January, 1937, issue). In nearly all instances that have come to our attention in the past month, these increases have been made voluntarily without strikes or threat of strikes.

Considerable speculation is current as to just why the United States Steel Corporation seemed to succumb so readily. *Iron Age*, to which the settlement came apparently as much a surprise as to anyone, in spite of inside knowledge of the steel industry, hints that the political setups in Michigan and Pennsylvania—those pro-labor administrations—and, probably, the labor-leaning national administration, were important factors. In other words, it is inferred that the Steel Corporation yielded on a matter of principle for fear of unpleasant political reactions.

That may be; but it is our guess that present executives of the Steel Corporation are broad gauge men who could see some justice in the demands of their workers. B. F. Fairless, president of Carnegie-Illinois Steel Corporation, is a self-made man. His father was a union coal miner. He knows the language of John L. Lewis, and he probably knows something of the man and his methods. In any event, Mr. Fairless (whose name, from his looks, might be spelled Fearless) did not yield on any recognizable principle. He has consistently favored, in his public statements, the highest wages commensurate with the industry's business and economic condition.

With the steel industry operating at around 90% of capacity, finding difficulty in meeting demands in some lines; with the U. S. Government sweating to place large orders for navy construction; in short with the time ripe to increase prices according to the time-honored "law of supply and demand," Mr. Fairless and his superiors and associates probably saw no great principle violated in conceding a 40-hour week and an increase in pay sufficient to make up for the shorter week. They would have had to come to a 40-hour week anyway to obtain the government contracts. Whether the price increases in steel would have been less without the wage increases is debatable, for prices were bound to increase.

As consumers of steel in various fabricated forms, probably producers of rock products are wondering whether full consideration was given to various recent mechanical improvements in steel production which must have

reduced costs. Only time will tell what these reductions are. If the executives of the Steel Corporation are as broad gauge in their view of their responsibilities to labor as they appear to be, they will doubtless also be broad gauge in their view of their responsibilities to customers and to the public. We doubt if exorbitant profits are part of their plans.

However, our rock products industries are not in any such favorable position to increase their prices immediately as their wage scales and costs increase. They will be driven to exercise their ingenuity to the limit to survive in the meantime. Their chief hope lies in increased volume and reduction of costs by improved equipment and greater efficiency in the use of their equipment. Unlike many industries, labor is not so large a factor in costs. The investment in plant per man employed in the cement industry, for example, far exceeds that in most others. Consequently, it is important that there be no useless investment in plant and that the plant be utilized efficiently. Obsolete equipment is a useless investment, and certainly a plant equipped with obsolete machinery can not be utilized efficiently.

• • •

The professors in and out of Washington, D. C., may debate the possibilities of inflation, but business men generally are quite aware that it is here now. They know their money is not going to buy as much labor and equipment as it did last year. They

Dangers of  
Inflation

know that if they have to get higher prices for materials they make, their customers who buy them will also have to get more money or get along without them. Since a large part of the products of this industry is still used by government, national, state and local, it means that with fixed sums appropriated there will be fewer public works, or if appropriations are increased it means more taxes, or more public debt, which is the same thing in the end. Rock products producers and manufacturers certainly derive no direct benefit from inflation, or loss in buying power of money.

Those who have faith in the future will hasten to put whatever money they can obtain at present low rates into such plant improvements as are justified in the interests of efficiency and the making of better products. Most experts agree that money will become dearer. Col. Leonard P. Ayers, Cleveland, Ohio, banker-economist, whose predictions have been fairly accurate, recently told a local newspaper interviewer: "I shall be much astonished if prices do not go on up to the 1929 level and higher. . . . My personal opinion is that we may move into a period

of permanently higher prices." If it turns out that way industry will not be particularly hurt when prices and incomes are readjusted to the new conditions. But the period of readjustment will be difficult for some.

The real danger, well recognized, is in unwarranted price increases caused by restriction of production, either by organized industry, or organized labor, or both, in cahoots. Against this danger there is, in the hands of the public, at present, a real weapon. The governor of the Federal Reserve Board, Marriner S. Eccles, has said control of money will not protect us from this kind of inflation. His remedy is an increase in taxes on incomes and profits to bring the national budget into balance, and to keep investment money cheap so that increasing production will keep prices down.

The administration at Washington, and congress, has let it be known that they haven't the intestinal fortitude to apply the first, direct and most effective remedy. Apparently they do aim to apply the other by generous use of the public's money to increase or encourage the increase of productive facilities. Since this is done for political as well as economic considerations the result is usually disastrous to those industries which appear easy to get into by the uninitiated, or apparently require no great amount of skilled management or labor—and this unfortunately applies to some rock products industries.

But, typical of the New Deal, the remedy most desired is clearly a direct approach to control of prices, hours and wages through some kind of a new NRA. It is to get such a law and make it stick that the President is so anxious to reorganize the Supreme Court. It is the aim of much other legislation, passed and pending. Business and industry, presumably, is against any further increases in income and profits taxes, yet owners and managers are going to incur far worse misfortunes from government attempts to check inflation by direct regulation of industry.

There is a way to check extravagant demands for wage increases. Like the way to check inflation, it is so simple and direct, and many employers won't believe it. That way is to educate your workmen in some of the fundamentals of business—your business.

Make  
Labor  
Partner

If your profits are not exorbitant there is no reason why you should desire to hide them. You can't hide them from the income tax collector; and employers are beginning to suspect this "confidential" information eventually gets into the hands of labor organizers and agitators. Therefore, you might as well tell your workmen what they are and how you earn them. Tell them their part in the enterprise, and tell them yours. The employer in Detroit who did a sit-down strike in his own office and refused to go out and sell the products which the sit-down strikers in the plant refused to produce, had the right idea. Such employes must learn to recognize that the owner or manager has his function to perform in a successful enterprise as well as that they have theirs.

Some large corporations, the Standard Oil Company, for example, have long furnished their employes with simple corporation financial statements, with explanations of what they mean. Recently several other corporations

have begun doing the same thing. Many publish magazines to inform their employes about their products and how they are used. Only large corporations can afford to publish elaborate house organs, as these company magazines are called, but any manager by mimeograph sheets, or better yet, by round table discussions with his employes can accomplish the same objectives.

A few corporations in the rock products industry have recently put their employes on a profit-sharing basis. This is admirable and is probably the ultimate answer of a capitalistic system to the threat of communism. It is to be hoped that such profit sharing schemes will be *bona fide* and that they will be so conducted that the employe feels a responsibility for the profit the company may earn. That is largely a matter of educating him in the rudiments of the business as well as giving him a part in the fixing of hours of work and wage scales. These latter he will probably be able to get anyway, whether you want him to or not. But he can be educated to do it intelligently and in his own interest rather than at the dictation of an outside agitator.

Portland cement manufacturers meeting in Chicago recently voted to adopt an autoclave test, which is severe and designed to show up any unsoundness, the cause of which is not yet fully determined. In any event some manufacturers will have to make a better product to pass this test. Announcing this action of the manufacturers, Wm. M. Kinney, general manager of the Portland Cement Association, said: "By voluntarily imposing on themselves at the earliest practical date this autoclave test for cement, cement manufacturers hope to guard against any possibility of unsoundness in cement not revealed by the present standard tests." That's good business and good publicity!

Certain U. S. Government officials are advocating and using an autoclave test for lime also. In the case of lime it reveals hard-burned particles of lime, dolomitic or high calcium, which hydrate very slowly or not at all, and may therefore get into a plastered wall or a mortar joint unhydrated. Presumably they do hydrate in the course of time, under certain conditions, and when this happens lime gets a bad name. The lime industry is by no means unanimously in favor of the autoclave test. Apparently, some manufacturers would prefer to take a chance with a product that may prove unsatisfactory than to devise ways and means to make a more satisfactory one.

We agree with those lime manufacturers in that the indiscriminate use of this test and the deductions that inexperienced inspectors might make from it for specification writing might cause rejection of otherwise satisfactory material. Intelligent use of the test is the real point at issue, not the test itself. The same may be said of the Los Angeles rattler test for aggregates. As control devices for perfecting products they can prove very useful. We also agree with cement manufacturers that the way to gain and hold markets or customers is to make the best possible product, not merely one that will get by. A test that develops possible weaknesses not otherwise obtainable, as advance information, should be encouraged and attention devoted to its meaning; it should not be dodged.

# PROFIT OPPORTUNITY

## To Market Fine Sand for Vibrated Concrete

By STANLEY M. HANDS, Oakland, Calif.

**I**N THE FIELD of concrete construction there have been two outstanding contributions to better practice in the past 20 years. One is Duff Abrams' publication of research work by the Portland Cement Association, which emphasized grading of aggregates and produced the water-cement ratio law. The grading of the aggregates determines the amount of water-cement paste required, but the water-cement ratio in the paste determines the strength of the concrete. The second contribution is the development and use of the vibrator for fabricating dry concrete mixtures. The vibrator will fabricate mixtures that are not so carefully graded and do not contain the higher quantities of water-cement paste.

**E**XCESS WATER is held to be the cause of most of the objectionable properties of concrete. Dry mixes, made with adequate proportions of fine aggregate, vibrated in place, or made into products and erected as complete units, are claimed to be the answer.

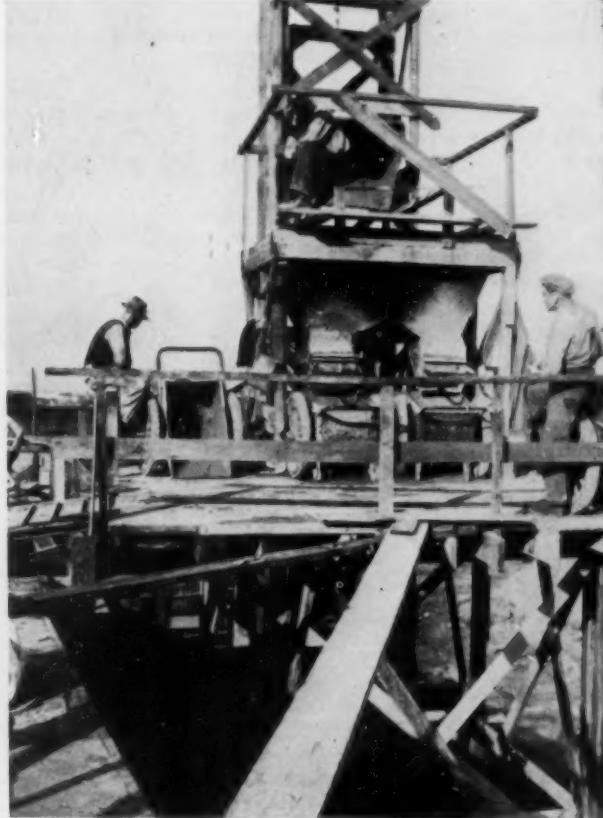
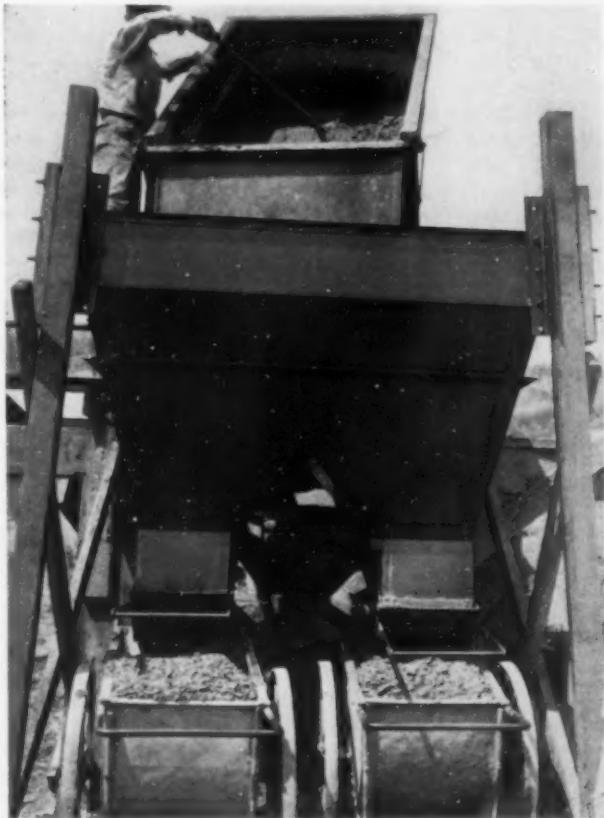
—The Editor.

New specifications provide for the basic strength requirement, and in a cruder way cover the use of the vibrator.

Experience with lower cement fac-

tors, together with vibration, point to the need for the design and manufacture of hoppers, buckets and mixers that will work more effectively with the new type of mixtures. The engineer takes the viewpoint that the mix should be designed to provide a concrete that has certain properties and that tools and methods should be made to fit this mix. This attitude, if it prevails, will cause the replacement of most of the present day concrete equipments. It may even mean, with higher labor costs, the beginning of dry erection and the end of wet construction.

In order that the scheme of construction may be effectively and profitably altered, it must be recognized that workable concrete for wet fabrication is



Floor hopper and tower hopper, full of concrete. Construction of these hoppers is suitable for rapid discharge of cohesive concrete mixtures.



View which shows stability of the mix after vibrator crew has finished consolidating the concrete



When fine sand is used, finishing must be done close to the spreading, to utilize the small quantity of water

not the same as workable concrete for vibrator fabrication. While it is true now that vibration is being applied to wet erection because strength is the dominating factor, it must be recognized that the precast products industry is also doing something with vibration. Factory-made products erected dry in the field are a very potent possibility for lowering construction costs.

Engineers are reasonably familiar with strength concrete and are beginning to be conscious of the need for volume constancy. It should be recognized that foundation stability, expansion-joint efficiency, cracking, crazing, warping, shrinkage, etc. are not accepted as inevitable in concrete construction in these days. Engineering has mastered the strength feature of concrete and will get to the bottom of volume constancy. All the evidence points to excess water as the cause of these evils.

#### **Stiffer Mixes Desirable**

Strength concrete is an accomplishment and other properties are measurable and controllable. The properties of wet concrete have not been controllable; and because of this, certain construction

practices have been adopted which in the minds of many construction engineers can not be changed.

The peculiar influence that water has upon wetted materials has been the subject of much investigation. The difference between stability and plasticity can be expressed in terms of water. The range of the volume of water within the stage from the stable to the plastic limit is the index to volume constancy and consolidation. The usual mixtures are designed on the plastic side of this curve, but vibrator mixes are designed nearer the top, and by the most optimistic on the stable side. With the right equipments for handling the concrete the stable mixes may be used if admixtures or fine sand is correctly proportioned into the mixture.

Good concrete has not been made from these stable mixes except at some additional expense, which arises from the lack of a tool to fabricate. The vibrator is that tool. Because of vibration the volume of water can be lowered so that the compactness of the materials in the moist consolidated condition prevents "water gain," and slow recessions or subsidence. Since construction practices have been largely

built up around strength and the initial properties of hardening, these substantial changes in concrete properties allow revolutionary changes in construction processes and routine. The newer scheme needs improved equipment, fine sand and the vibrator.

Stability is measured by resistance to flow or resistance to the vibrator. The internal mechanics which resist an internal vibrator are due to three distinct parts of the mixture. The fine fractions predominately cause cohesiveness. The intermediate fraction causes particle interference. The larger sizes cause interlocking. The water-cement paste goes into the voids between the particles. Changes in grading cause changes in quantities, and therefore cause changes in the intensity of that part of stability originating from the characteristic properties of these groups. Changes in grading may affect the unit volume weights, and therefore will affect the volume of that part in which a change takes place.

If, however, the materials are batched by weight and proper consideration is given to specific gravity and moisture, changes in grading do not have much effect upon the effectiveness of the

water-cement paste for vibrated mixes. The most important part of the mix is the fine portion, and if this grading is controlled the grading of the rest of the mix is not of great importance. It should be obvious that fine sand and vibration makes it possible to use a wide range of coarse gradings. Axiomatically, it should be possible to select a particularly composed type of stability to fit the conditions of placement. Therefore, the type of mix will influence the construction schedule.

Nothing that has been said here should be construed to mean that the maximum size of aggregate may be disregarded in the design for cement efficiency. The relationships for wet mixes which are fundamental are equally important in the two types of mixes. It will be observed that the amount of fine sand, cement and water will decrease as the maximum size is increased. This is a very significant point in the scheme of picking a mix to fit the placing conditions. In cases where the maximum size was  $\frac{3}{4}$  in. for wet placement,  $1\frac{1}{2}$  in. sizes may be used with a vibrator. This change should mean a saving of approximately one-half sack of cement per cubic yard. The writer uses the product of a 2-in. square screen for crushed rock and a 2-in. round screen for gravel in making concrete for thin walls.

#### Fine Aggregates Come to the Front

Until the vibrator came on the market, coarse aggregates were the object of most studies in workability. Subdividing groups of sizes was being carried to the limits of storage space. With aggregate groups reduced to a limited range, the storage problem is solved with high speed auto-scale batching equipments and belt conveyors.

An equal amount of attention was not given to fine aggregates until after all that experience had only partially solved the problem. Then the fine sand came into its own. Many plants now separate the sand into three or more groups and reblend; but the most effective way is to ship the desired sizes to the batching plant where they can be accurately weighed out and mixed throughout the concrete according to the kind of mix wanted for the work.

Emphasis must be placed upon accurate batching. Regardless of all claims to the contrary, there is no way of predetermining the workability or quality of the concrete except by consistent proportioning. No amount of experience qualifies anyone to say much about the first mix or any subsequent mix if the control is not good. The evils of bad control will catch up with the inspector. The effects of poor con-

trol and poor concrete show up very quickly. But even though batching is bad and aggregates are worse, water should not be used beyond the plastic limit, and free water should be avoided like poison.

Fine sands have a property for taking up water so that slight variations are not likely to cause a free water condition.

#### Aggregate Producers' Opportunity

We are looking for something new to revive business. The aggregate industry has expanded its original activity of making aggregates, and it is not uncommon for income from these other activities to be greater than that from aggregates. Therefore the management may feel that it has found the answer to the question of how to operate profitably. This additional investment, and its predominant place in the business is a hazard.

It should be recognized that all things considered, the present trend is for dry mix construction. Dry mix construction means machine-made parts. Dry mix construction, therefore, means light construction parts which may be easily assembled with a small labor outlay. Products from other materials promise to force concrete into less massive designs. These trends are evident, and if dry mix construction gains favor the processing of aggregates will again become important.

Regardless of the speed of the change to dry mix construction, the immediate prospects are favorable for drier field mixes. The best way to get along with

the less water is to be careful in selecting the aggregates. Competition with methods which are illustrated here will make the proponents of wet concrete sharpen up the pencil. When it comes to quality, enough has been said to make it evident that when the engineer discovers the process, the vibrator and fine sand will be specified.

#### Business On the Up

THE TINTINGER GRAVEL PIT, near Cascade, Mont., reports greater shipments in 1936 than in any year since 1929. A total of 348 cars of gravel were shipped during 1936.

#### Silica Brick Advance

REFRACTORY COMPANIES have advanced the prices of silica brick \$2 per net ton to \$49, the new prices to be effective immediately and to apply only to second quarter shipments.

#### Opens New Gravel Pit

LA CROSSE SAND AND GRAVEL CO., La Crosse, Wis., is opening a new gravel pit on 110 acres of land leased a mile south of the city. New machinery has been purchased and placed. Edwin E. Meyer is president and operating field manager and Ralph C. Hartman is secretary and treasurer. According to reports, orders for large tonnages of sand and gravel are already on hand.

#### Buys Stone Plant

HUGHES STONE CO., Tulsa, Okla., has purchased the stone plant south of Sand Springs, Okla., from the MONARCH CEMENT CO.

#### To Build Diatomite Plant

D. A. NELSON MANUFACTURING CO., Seattle, Wash., is planning to build a \$5000 diatomite plant near Ritzville, Wash.

#### New Gravel Plant

HARRY T. CAMPBELL SONS CO., INC., Towson, Md., has recently completed a new sand and gravel plant at Cowenton, Md., on Philadelphia Road toward Wilmington, Del. The plant consists of a 12-in. Hetherington & Berner pump dredge, with Telsmith screening, classifying and conveying equipment. The plant will be powered with a 600-hp. Diesel engine, and it is designed to have a capacity of 125 tons per hour. The company already has a contract to supply 250,000 tons of aggregates to James Stewart & Co., New York City contractors, who are building a new strip mill for the Sparrows Point, Md., plant of Bethlehem Steel Corp.



Example of continuous placement of top of column and cap with no recession at "a"; pointing and plastering unnecessary



Longest

# ROTARY LIME KILN

At Bellefonte, Penn.

**Chemical Lime Company's  
New Plant Has Several Special Features for Quality Control**

By BROR NORDBERG

Associate Editor, Rock Products

**L**ONGEST and what is claimed to be the most efficient rotary kiln yet installed in any lime plant in the United States and close and accurate electric-mechanical control of the processes governing the quality of the finished products are highlights of Plant No. 3 of the Chemical Lime Co. just completed near Bellefonte, Penn. This plant, with the development of a new stope mine, was completed during the past twelve months. It is located on the Bellefonte limestone ledge—well-known for the unusual purity of its stone.

The cost of the project, including purchase of an additional 1 1/4 miles of stone in the Bellefonte ledge, was upwards of \$750,000, of which the major portion was secured as a Reconstruction Finance Corporation industrial loan on a long-term basis. Additional equipment was taken from the company's former crushed-stone plant. Granting of the loan was timely—coming when modernization and improvements were imperative at the company's other two plants nearby, in order to continue operations and employment. The lime plants in the Bellefonte area are probably the greatest single source of employment to its residents.

One Hundred and Fifty Thousand dollars have been paid out in wages to labor during construction of the new

plant, including many experienced employees necessarily imported for these developments, some of whom have established permanent residence at Bellefonte. The enterprise has had and will continue to have quite an influence on the well-being of the community as a whole.

#### *Design and Equipment*

Officers of the company designed the plant and directed and supervised its construction; in this they were materially aided by the Engineering Division of the R. F. C. and by the expert assistance of engineers representing the manufacturers of the equipment installed. Those concerns which assisted in the design, and the equipment installed by them, are as follows:

Ingersoll-Rand Co.—Compressors for drilling and mechanical loading in the mine.

Robins Conveying Belt Co.—All screens and belt conveyors in the mine and in the stone crushing, screening and storage plant.

Webster Manufacturing Co.—Stone feeder to the kiln.

Traylor Engineering & Manufacturing Co.—The kiln, cooler, burner and the stone crushers.

Kennedy-Van Saun Manufacturing and Engineering Corp.—Coal- and lime-

pulverizing mills, stone and coal surge tanks, cyclones, containers and pulverized coal firing system.

Buffalo Forge Co.—Fans for primary and secondary air, induced draft.

General Electric Co.—All plant motors and electric-mechanical kiln control.

Stephens - Adamson Manufacturing Co.—All lime-handling and screening equipment, "Redler" elevators and conveyors.

Scranton Electric Construction Co. also assisted in the plant design and the development of all electric controls, as a representative of the Buffalo Forge Co., the General Electric Co. and the Ingersoll-Rand Co.

Ground was broken April 1, 1936, and the kiln was first turned over in February, going into production early in March, 1937. The stone-crushing plant had been in operation for some time, filling the kiln feed bins and sizing stone for use in Plant 2 nearby. Stone is mined to make available the highest quality rock, testing 99.2% calcium carbonate.

#### *Mining Methods*

Miners, with years of experience in stope mining, were brought in from the northern Michigan iron ore mines to work in the new mine, which is being operated in typical stope mine fashion.

*Four hundred feet of kiln reaches from the stone screening plant on the left to the lime storage bins on the right at*





Stone is loaded by scraper hoists to mine cars and hauled to the slope, during the mine development work.



Experienced miners were imported to work in the mine. Here may be seen two men drilling in the main drift.

These men have established permanent residence at Bellefonte. Mining will more than supply the tonnages needed for capacity operation of the new plant, and will eventually furnish all stone for the other two plants owned by the company.

The main slope into the mine extends a distance of about 1000 ft. in a north-easterly direction, at an 18-deg. angle of depression, to the Bellefonte ledge, where a main drift is run at right angles to the slope.

The stone ledge is on a 70-deg. angle to the vertical and is 70 ft. thick, where stoping is now being done. When a stope man-raise is put through to the surface of the ground, natural ventilation will be entirely adequate, but during the development work, artificial ventilation is being supplied from above through a 20-in. pipe.

All stope and drift development work is being done by Ingersoll-Rand air compressors and drill equipment, and all of the "muck" produced is loaded with one of two Ingersoll-Rand scraper hoists equipped with  $\frac{1}{2}$ -yd. scrapers.

Compressed air is furnished at 100 p.s.i. by dual Imperial type 10, size  $12\frac{1}{2}$  x 14-in. and 20 x 14-in. Ingersoll-Rand compressors. The compressors are equipped with after-coolers and are belt-driven by 200-hp. motors equipped with Rockwood drives.

During the development work, rock is loaded by the scraper hoist into  $2\frac{1}{2}$ -yd. side-dump cars, which are hauled to the foot of the slope by a Manchua electric locomotive. Temporarily, rock

was being sledged to pass a 9-in. grizzley over the lower end of the slope belt conveyor.

Minus 9-in. rock is carried up the 18 deg. incline by two, 480-ft. centers, Robins 30-in. belt conveyors in tandem. These conveyors travel 200 lin. ft. per min. and have a rated capacity of 200 tons of minus 9-in. stone per hour. They extend to the crusher building above.

When the mine development is completed, all rock in the mine will be handled by belt conveyor, representing a total of some 2000 ft. Sledging is to be done away with and large rocks are to be crushed to conveyable sizes in the mine.

A Traylor 16-in. gyratory crusher is being installed below the main drift, and a Traylor heavy-duty revolving screen. Plus 9-in. stone will be crushed to 3 in. and under and minus 9-in. stone will bypass the crusher.

Stone from the stope openings will be carried to the screen by belt conveyors, after first passing through a 16-in. rail grizzley located off of a sub-drift between the main drift and the stope; and stone will be allowed to flow to the belt conveyor from the stopes by a heavy duty movable pan feeder located on a track over the belt conveyor. Rock will be transported from the crushing-screening unit to the foot of the main slope over 200 ft. of 30-in. belt conveyor.

Present workings are 340 ft. below the surface of the ground. Stopes are to be 250 ft. high, forming 250 x 250 x

70-ft. rooms, leaving 50-ft. pillars. Other roof support will not be needed. The immediate main development will extend east and west from the main slope a distance of  $\frac{3}{4}$  mile on each side; eventually this development will be extended westward about  $1\frac{1}{2}$  miles at a depth of approximately 400 ft. below the surface.

Men and tools are lowered into and raised from the mine workings by an industrial car traveling parallel to and alongside the belt conveyors. The car is powered by a Stroudsburg hoist above at the entrance to the mine.

All stone handling equipment, including screenings, conveyors and elevators, was furnished by the Robins Conveying Belt Co.

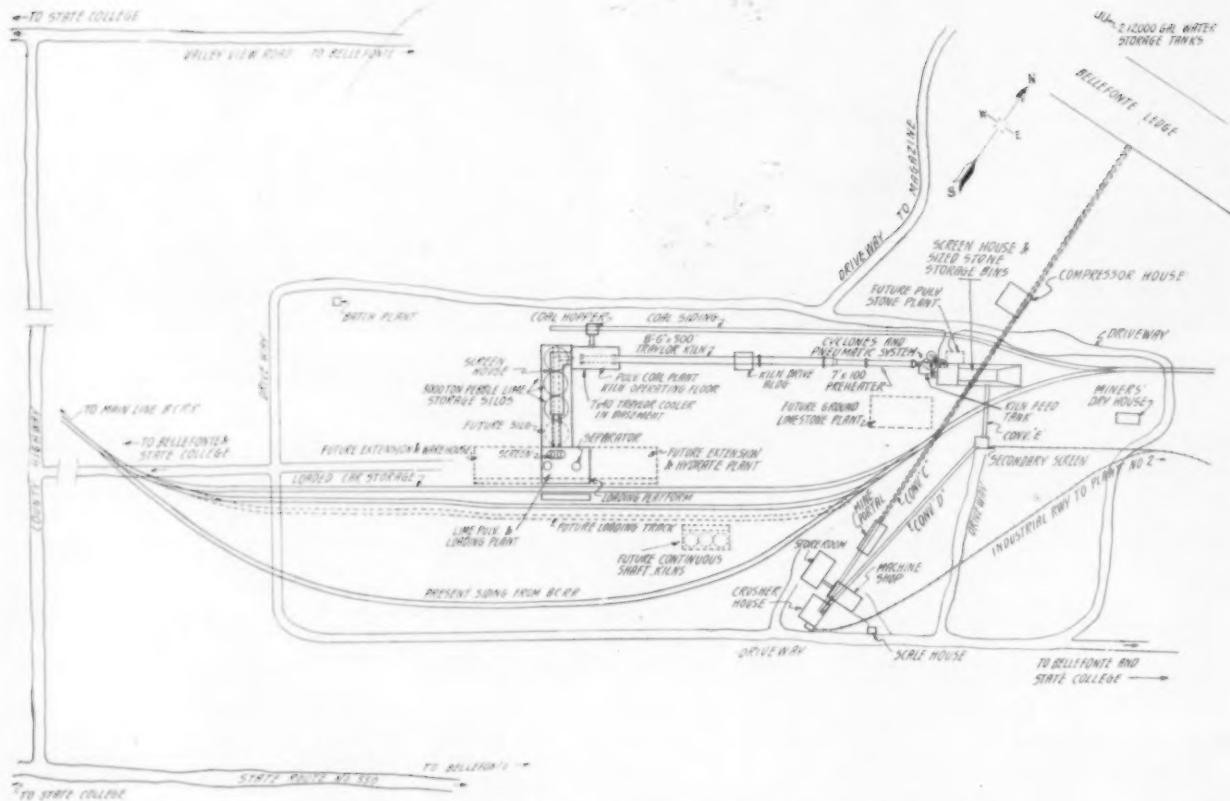
#### Crushing Plant

Stone coming from the mine to the crusher house is 9 in. and under. Here, the stone is discharged from the belt conveyor over a single-deck 4 x 10-ft. "Gyrex" vibrating screen. Stone passing the 3-in. square openings in the first 4 ft. of the screen goes to the screening plant, over the rotary kiln feed bins.

Plus 3-in. and minus 7-in. stone is reduced to 3 in. and under, in a No.  $7\frac{1}{2}$  Traylor gyratory crusher and moves forward to the screening plant over feed bins for the rotary kiln. Stone retained on the 7-in. openings on the lower half of the Gyrex screen, all under 9 in., is hauled in industrial cars for use in the shaft kilns at Plant No. 2, 1000 ft. away.

Plant No. 3 of Chemical Lime Co. The crusher house is at the exact center, compressor house on the extreme left





General layout of the plant, also showing future additions to be made

### **Screening Plant**

Minus 3-in. stone is carried on a 24-ft. Robins belt conveyor, 200-ft. centers, on a 14-deg. incline to a vibrating scalping screen. This screen, a double-deck 4- x 6-ft. unit, removes the minus  $\frac{3}{8}$ -in. material. This fine product is transported to the ground limestone mill at Plant No. 2, to be used in the manufacture of glass stone, mine dust, agricultural stone and other fine products.

The minus 3-in. stone retained on the  $\frac{3}{8}$ -in. mesh screen is carried over a 24-in. Robins belt conveyor to sizing screens, directly over the stone storage products.

bins. Here, it is first passed over a double-deck 4- x 6-ft. Gyrex screen. Tramp iron is removed by the Dings magnetic head pulley as the conveyor discharges to the screen.

Opening on this screen are  $1\frac{1}{4}$  and  $1\frac{3}{4}$  in. Minus  $1\frac{1}{4}$ -in. stone is carried over a 40-ft centers, 16-in., Robins belt conveyor and passed over a single-deck 4- x 6-ft. Vibrex screen with  $\frac{3}{4}$ -in. openings. The four sizes,  $\frac{3}{8}$  to  $\frac{3}{4}$  in.,  $\frac{3}{8}$  to  $1\frac{1}{4}$  in.,  $1\frac{1}{4}$  to  $1\frac{3}{4}$  in., and  $1\frac{3}{4}$  to 3 in., drop below to their respective bins for use in feeding the kiln. These concrete bins are each 25 ft. square and 40 ft. deep, with foundations resting

on solid rock. The bin capacity for each stone size is 1000 tons.

### Kiln Feed of Uniform Size

Stone from these bins is reclaimed through an 8-ft. square tunnel on a 24-in. belt conveyor, 105 ft. centers, the flow of stone from the bins being regulated by a Robins feeding mechanism. This conveyor discharges to the boot of a 105-ft. Robins bucket elevator, filling a 160-ton steel surge bin immediately above the feed end of the kiln.

Storage in this bin is sufficient to keep the kiln running from 6 to 8 hours, based on 2 tons of stone required for each ton of lime. Stone is fed to the kiln through a special Webster pan feeder.

#### Reason for Long Kiln

Slow calcination at low temperatures was considered essential for the manufacture of the high grade chemical lime desired. A 400-ft. kiln was selected to permit a slow movement of material, along with a high capacity. The kiln was manufactured by the Traylor Engineering & Manufacturing Co. and is of all-welded construction.

It consists of a 300-ft. zone of calcination, a 10-ft. tapered section and a 90-ft. preheating zone. The outside diameters for the kiln length and pre-



## ROCK PRODUCTS

heating zone are 8 ft. 6 in. and 7 ft. respectively. It has the standard pitch of  $\frac{1}{2}$  in. to the foot and is driven by a 60-hp. G. E. motor. To insure uninterrupted operation during possible electric power shut-offs, a 110-hp. Ford V-8 gasoline engine, furnished by K. R. Wilson Co., Buffalo, N. Y., was installed and engaged to the kiln by a clutch coupling, to be operated by push-button control.

The shell thickness is  $\frac{3}{8}$  in. throughout except for a 1-in. thickness under the tires. The revolving load when empty is 1000 tons, including 568 tons of fire brick throughout its length. The 200 ft. of kiln length at the discharge end is also lined with 2-in. Johns-Manville "Superex" insulation, which with a 7-in. brick lining leaves an inside kiln diameter of 7 ft. A 6-in. brick in the smaller section of the kiln leaves a 6-ft. inside diameter. General Refractories 70% alumina brick are used throughout, with 319 Johns-Manville insulating cement between the insulator and the brick. Capacity of the kiln is expected to be 200 tons of high grade chemical lime daily.

#### Cooler and Accessories

After about three hours in the kiln, lime passes to a 7- x 40-ft. Traylor-Cheesman rotary cooler and heat recuperator of the multiple-tube type, below the firing floor. In passing through this cooler, the temperature of the lime is reduced from 2200 deg. to somewhere between 200 deg. and 300 deg. The heat recovered in the cooler is utilized to heat both the primary and secondary air needed for combustion in the kiln; at no time does outside air come into contact with the lime.

#### Coal Firing

Fuel used is a high volatile western Pennsylvania coal, low in ash and sulphur content. Coal is raised from the concrete track hopper to a 60-ton steel bin above the coal pulverizer by a Stephens-Adamson "Redler" elevator. Coal is pulverized through a 4- x 9-ft. Kennedy, air-swept tube mill, driven by a 75-hp. G. E. synchronous motor through a Philadelphia gear drive.

A No. 6 Buffalo "duplex conoidal" fan pulls about 16,000 cu. ft. of air through the cooler counter-current to the flow of lime for maximum heat exchange. Heated air is recovered for combustion, at a temperature of about 800 deg. and accumulated in a hot air reservoir.

About 20% of the air needed for combustion in the kiln is introduced with the pulverized coal as primary air at 400 deg. after passing through the coal mill, and the secondary air is injected into the kiln at 800 deg.



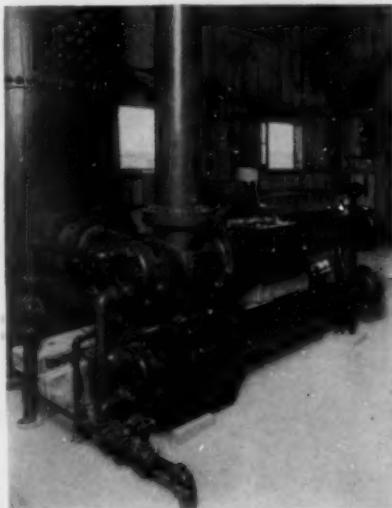
Stone is fed to the kiln by a pan feeder below the surge bin

The kiln is fired through a Traylor-Cheesman luminous double-tube burner, the primary air and coal being introduced through the inner pipe and the secondary air through the annular space between the inner and outer pipes. Excess recovered air, when the hot air reaches a certain pressure, is released through an emergency outlet, and will eventually be used to heat the building.

Induced draft is furnished by a No. 12 SSL Buffalo fan at the feed end of the kiln, which pulls about 40,000 cu. ft. of gases per minute through the kiln. A stack temperature in the neighborhood of 400 to 500 deg. is expected.

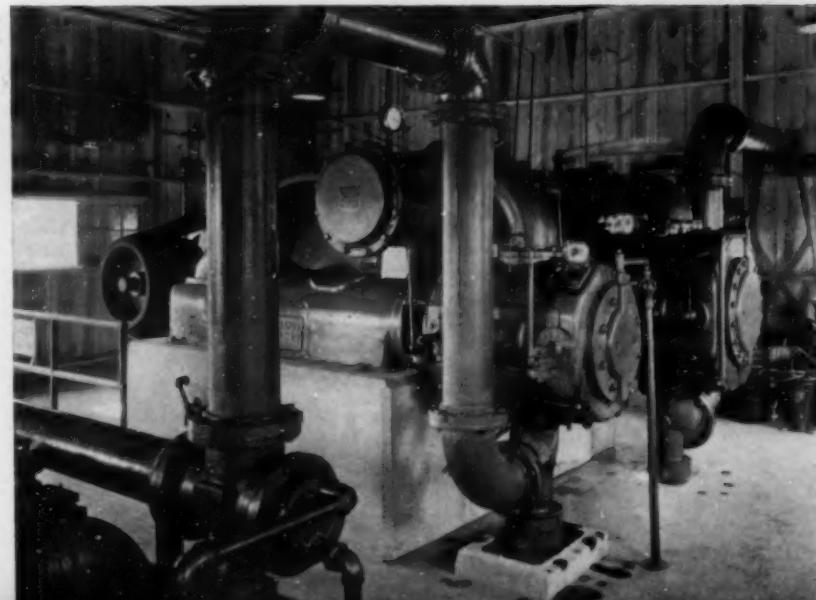
Exhaust gases from the kiln pass through two 11-ft. Kennedy cyclone dust collectors, which are discharged to

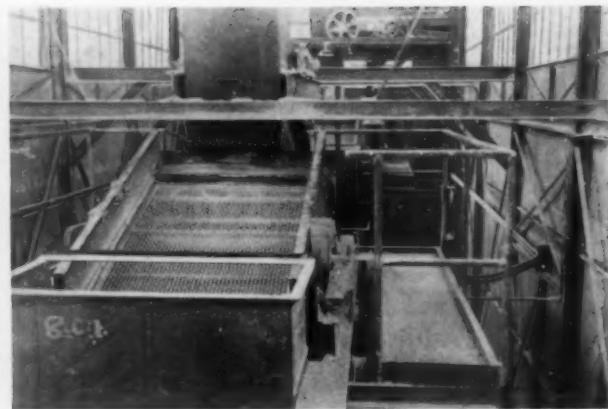
two 10-ton Kennedy pneumatic containers. Fines reclaimed from the exhaust gases are pumped from these containers to a storage tank.



RIGHT—The air compressors are equipped with after-coolers

BELOW—Air for drilling and loading of rock is compressed to 100 p.s.i.





Lime is sized over vibrating screens after passing over a picking belt

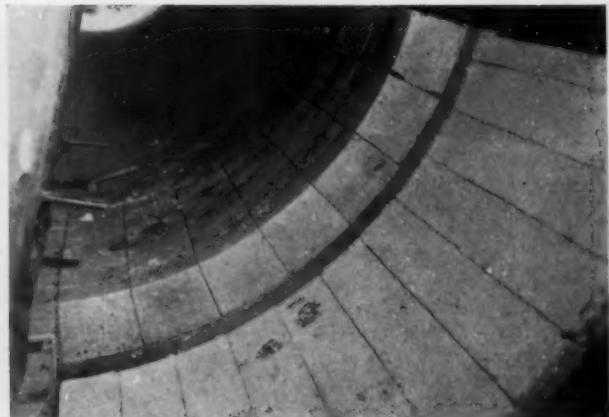
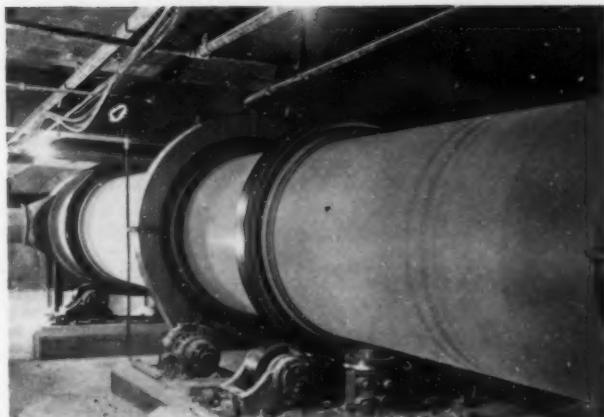


ABOVE—Stone handling and sizing plant as seen from the lime storage bins. Crusher house is on the right

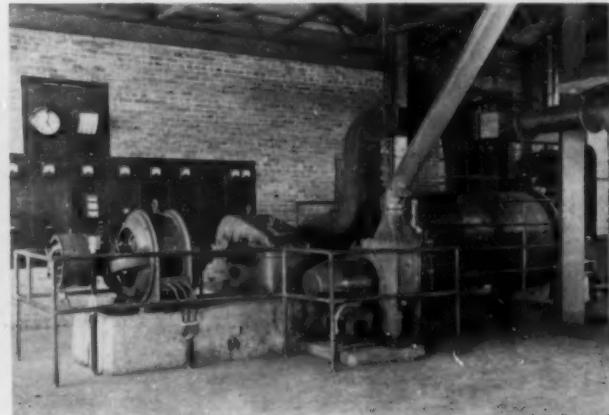
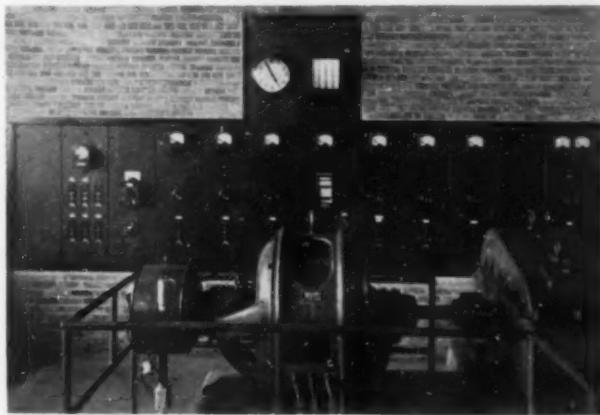


BETWEEN—Pebble lime storage bins with screen house above. Lime is pulverized in the left building

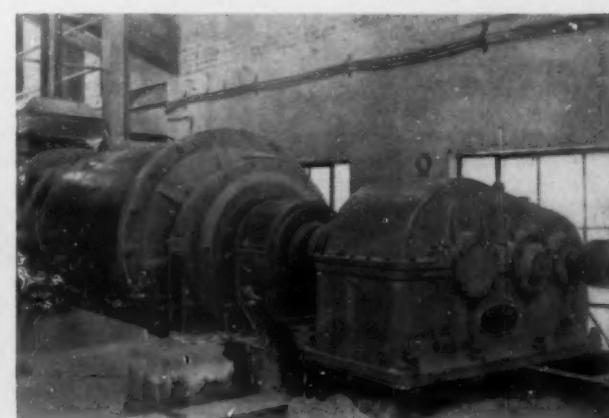




LEFT—Heat recovered from the cooler is utilized to heat primary and secondary air. RIGHT—Lining of fire brick and insulation in the kiln separated by insulating cement



LEFT—Operations of the kiln are controlled from this switch-board. RIGHT—High grade coal is pulverized by the air-swept tube mill on the right and introduced to the kiln with heated air



LEFT—A 60-hp. motor turns the kiln through a gear reduction. RIGHT—Pebble lime is pulverized through a 4 x 9-ft. ball mill in the loading plant

#### Lime Handling

Lime discharges from the cooler to the boot of a 100-ft. "Redler" elevator, which carries it to the lime screening plant above the lime storage silos. These three concrete bins are 30 ft. in diameter and 66 ft. high, with a partition in each, for the storing of six

sizes. Total storage capacity for pebble lime is 4200 tons. Only 19 days were required to build these silos by company labor, using steel Metaforms.

Coming from the head of the 100-ft. elevator, lime passes over a 42-in. Stephens-Adamson picking belt, where any tramp material is removed.

From the picking belt, lime is carried to the two double-deck 4 x 6-ft. Stephens-Adamson sizing screens by a "Redler" conveyor. To avoid breakage, sized lime passes to the bins below over Holmes spiral chutes. The six sizes of pebble lime are 0 to  $\frac{1}{8}$ ,  $\frac{1}{8}$  to  $\frac{3}{8}$ ,  $\frac{3}{8}$  to  $\frac{3}{4}$ ,  $\frac{3}{4}$  to  $1\frac{1}{4}$ ,  $1\frac{1}{4}$  to  $1\frac{3}{4}$  and  $1\frac{3}{4}$  to 3 in.

Lime is drawn from these bins by belt conveyor and elevated by "Redler" conveyor to discharge to cars on either one of two railroad tracks, or to steel bins. The loading plant is equipped with a 4- x 9-ft. Kennedy ball mill for pulverizing lime, and the bagging and packing units.

Four 60-ton steel bins for bagging pulverized and pebble lime are provided. The plant is located about 1 mile from the Bellefonte Central railroad. About 4000 ft. of track was laid on a 2 1/4% grade into the plant. Shipments can also be made by truck.

### Electrical Features

The operations of the kiln and lime-loading plant are controlled from one switch-board; the kiln being equipped with automatic controls developed by the company to effect positive and complete calcination under low temperature and assure an evenly burned "Kno-Kore" product, making the kiln operator more or less of a watchman.

All kiln motors are driven by direct-current electricity, for more accurate speed control. The controls for all these motors are on this firing room switch-board together with a Bailey draft gauge; pyrometers for indicating temperatures at various points; temperature gauges for exhaust gases, primary and secondary air, the coal mill and the lime discharge; and a speed indicator for the kiln recording tachometer; all of which are interlocked and automatically controlled.

The feed of stone into the kiln; the starting and stopping of the feeder motor; and the flow of stone to the belt conveyor in the mine are controlled by photo-electric cells. Similar electric eye control will eventually govern practically all operations.

A total of 1500-hp. in motors is needed to drive all plant machinery in addition to a 200-k.v.a. motor-generator set to transform alternating current to direct current for the kiln motors.

The plant is of electric welded construction throughout, and is equipped with a complete machine and blacksmith shop for the maintenance of the mine and its equipment. Included in the maintenance equipment are three 200-ampere Lincoln welding machines.

### Future Growth—Personnel

Extensive future expansions are allowed for in the plant layout. Among them are a pulverized stone plant adjacent to the screening plant; a ground limestone plant; continuous shaft kilns; a warehouse extension to one side of the loading plant; and an extension for a hydrating plant.

Officers of the company are W. L. Case, president; R. S. Walker, vice-president; Thomas M. Brown, vice-

president; R. M. Gehret, secretary and assistant treasurer; and W. J. Emerick, treasurer. S. H. Smith is general superintendent; Bayard Magee, plant maintenance engineer; and Henry Auvinen, mine captain.

### Stone Ballast Specifications Tighten Up

A NUMBER of changes and revisions were incorporated in the American Railway Engineering Association's specifications for stone and slag ballast at the March meeting of the A.R.E.A., to take effect in 1937. Fundamentally, the new specifications are the same as those submitted at the 1936 meeting as advance information, the main differences from the last specification, adopted in 1931, being in regard to allowable limits set for deleterious matter, the addition of an absorption test requirement, the exclusion of the "cementing value" requirement and the listing of definite required procedures for testing.

Angularity was specified as a requirement under "General Characteristics" and a paragraph was included, stating that deleterious substances should not exceed the following amounts:

Material finer than 200 mesh sieve .1%  
Soft and friable fragments..... 5%  
Clay lumps ..... 0.5%

Size limitations under "Gradation in Sizes," from 1937, are based on square screen openings as follows:

Designation	Nominal size square openings	Approximate size round openings	Amounts finer than each sieve (square opening per cents by weights)					
			3 in.	2 1/2 in.	2 in.	1 1/2 in.	1 in.	5/8 in.
2A	1-2 in.	1 1/4-2 1/2 in.	...	...	100	90-100	35-70	0-15
3A	1/2-1 in.	5/8-1 1/4 in.	...	...	...	100	90-100	0-5
3B	5/8-1 1/2 in.	7/8-1 3/4 in.	...	...	100	90-100	20-55	0-15
23B	5/8-2 1/2 in.	7/8-3 in.	100	90-100	...	25-60	...	0-10

In specifications for prepared blast furnace slag ballast adopted at the 1936 convention it had been recommended that the table of gradation therein be changed to conform with the gradation table in specifications for stone ballast.

Under the paragraph "Physical Requirements," it is stated that "stone ballast shall be considered to have the desired physical requirements when acceptable evidence is available showing that the stone has proved satisfactory in service under conditions essentially the same as those for which it is proposed for use," and that stone ballast failing to meet this requirement shall be subjected to physical tests for absorption, toughness, percentage of wear and soundness (sodium sulphate).

Results from the following number of tests should be averaged:

Kind of tests	Percentage of			
	Aborption	Wear	Toughness	Soundess
No. of tests.....	2	3	(a)	2

(a) Use six test cylinders, three drilled parallel and three at right angles to the bedding plane.

Under the discussion of handling, the phrase "provided the stone has not become segregated" was added in the paragraph stating that ballast shall be loaded directly from the screen or from clean bins or storage piles.

Carloads of defective material arriving at the site for unloading and not previously inspected shall be rejected and *returned* in 1937 instead of disposed of at the expense of the producer, and so on.

A complete outline of testing methods was introduced as follows:

(a) **Sampling the Quarry.** Two samples shall be taken from each ledge or different quality of stone used in the preparation of the ballast.

Samples of the finished product for gradation and other required tests shall be taken from each of 200 tons of aggregate delivered unless otherwise ordered by the engineer. Samples shall weigh not less than 100 lb.

(b) **Sieve Analysis.** The sieve analysis shall be made in accordance with the Standard Method of Test for Sieve Analysis of Aggregates for Concrete (A.S.T.M. designation: C 41).<sup>1</sup>

(c) **Material Finer Than 200 Mesh Sieve.** The per cent of dust, dirt, loam, and other fine material shall be determined in accordance with the Tentative Method of Test for Determination of Amount of Material Finer than No. 200 Sieve in Aggregates (A.S.T.M. designation: C 117-35T).

(d) **Soft and Friable Particles.** The percentage of soft and friable particles shall be determined in accordance with the Standard Method of Test for Quantity of Soft Pebbles in Gravel (Method T-8) of the American Association of State Highway Officials.

(e) **Clay Lumps.** The percentage of clay lumps shall be determined by examining the

various fractions which remain after the sieve analysis. Any particles that can be broken up with the fingers shall be classified as clay lumps and the total percentage of all clay lumps shall be computed on the basis of the total original weight of the sample used in the grading test.

(f) **Absorption.** The absorption shall be determined by A.S.T.M. Tentative Methods of Test for Specific Gravity and Absorption of Coarse Aggregate (A.S.T.M. Designation C 127-36T).

(g) **Toughness.** The toughness test shall be made by A.S.T.M. Standard D 3-18, Test for Toughness of Rock.

(h) **Soundness.** When the accelerated soundness test is required, it shall be made in accordance with the Tentative Method of Test for Soundness of Coarse Aggregate by Use of Sodium Sulfate or Magnesium Sulfate (A.S.T.M. Designation: C 89-35T) or subsequent revisions thereto.<sup>2</sup>

(i) **Deval Abrasion Test.** The abrasion test shall be made by A.S.T.M. Standard Method D 2-33.

<sup>1</sup> 1933 Book of A.S.T.M. Standards, Part II, p. 113.

<sup>2</sup> 1933 Book of A.S.T.M. Standards, Part II, p. 1244.

# WEST COAST SECTION

Conducted by  
GEO. D. ROALFE,  
Consulting Engineer,  
Los Angeles, Calif.

## Motor Trucking Costs

PASSAGE of the Highway Carrier Act, Chapter 223, and the City Carrier Act, Chapter 312, Statutes of California, 1935, authorized the Railroad Commission to hold hearings, to establish rates and rules and to adjudicate reported violations, in an attempt to stabilize the motor trucking industry and secure reasonable transportation rates in California.

As a preliminary step to establishing regulations under these acts, the Railroad Commission's engineers made an extensive study of trucking practices, costs and rates for the entire state.

In setting up unit costs, the Railroad Commission attempted to establish such minimum costs as would insure the dump truck operator a remunerative rate based upon a cross-section of the industry. The entire investigation was initiated by the Commission on its own motion for the purpose of establishing just, reasonable and nondiscriminatory minimum rates applicable to the transportation for compensation or hire of sand, rock, gravel, excavated materials and building materials over the public highways of the state of California, including those within any and all cities.

The ton-mile basis of rates is commonly employed for the transportation of sand, rock, gravel, decomposed granite (road base material) and batched or other mixes. While the studies for proper ton-mile rates were made for the entire state, rates on this basis have only been established in the southern California area. In the northern portion of the state the hourly basis is almost universally used. The actual computation for southern California only will be treated herein, there being slight adjustments in calculating rates for the northern part of the state, due to local differences.

### Cost Calculations

Under the regulations of the Commission, all dump trucks are placed in six classes, based on water level measures of capacity, as follows:

- (1) Less than  $2\frac{1}{2}$  cu. yd.
- (2)  $2\frac{1}{2}$  cu. yd. or over, but less than  $3\frac{1}{2}$  cu. yd.
- (3)  $3\frac{1}{2}$  cu. yd. or over, but less than  $4\frac{1}{2}$  cu. yd.

**ROCK PRODUCTS'** new West Coast editorial representative was born in Mexico City, Mexico, in 1891, of American parents—his father was an official of the Waters Pierce Oil Co. Educated in engineering in California, after a varied experience, he became established as a consulting engineer in Los Angeles, specializing in the production and use of the non-metallics. He has designed either in whole or in part numerous rock products plants, and has done extensive research on aggregates in the field of concrete technology. Mr. Roalfe, of course, continues his private engineering practice, but he will keep Rock Products readers informed on developments on the Coast and visit Rock Products' many subscribers and friends there in search of such news and developments from time to time.—THE EDITOR.

- (4)  $4\frac{1}{2}$  cu. yd. or over but less than  $5\frac{1}{2}$  cu. yd.
- (5)  $5\frac{1}{2}$  cu. yd. or over, but less than 7 cu. yd.
- (6) Over 7 cu. yd.

The cost study for convenience is divided into three general divisions; namely, general data, fixed costs, and variable costs.

### General Data

Automotive equipment for dump truck operations will vary somewhat even within the groups, included in the several classes. It was found necessary to consider the average cost of the equipment, bearing in mind the type of trucks in most general use in each of the classes. These average values were fixed at \$1200, \$2400, \$3400, \$4000, \$5200 and \$6200 for the six classifications.

The salvage value allowance was taken as the turn-in or junk value at the end of the useful life of the truck. These values are shown in the summary of costs. The amount to be depreciated is taken as the investment, less cost of tire replacement and salvage value. Values assigned are given in the summary. The commission has set the fair average yearly mileage of dump trucks in classes (1), (2) and (3) at 25,000 miles and in classes (4), (5) and (6) at 20,000 miles for the southern portion of the state. In the calculation for the northern part of the state, these values would be reduced to 18,000 and 15,000 miles respectively. In establishing a fig-



Geo. D. Roalfe

ure for hours per year, the engineers based their computations on work factors or percentages of total work time of 8 hr. for 365 days. A full year would thus contain 2920 working hours. A work factor of 65% was used for trucks in Classes (1), (2) and (3), or 1898 operating hours in the area under consideration. For classes (4), (5) and (6) this factor was reduced to 60% or a total of 1752 operating hours.

Full consideration was given to the two main controlling factors, economic retirement and obsolescence, in calculating the estimated truck life in miles. The values adopted by the commission were taken as 75,000, 75,000, 100,000, 120,000, 140,000 and 140,000 miles respectively for the six classes under consideration in the given region. The estimated truck life in years was considered to be in direct proportion to the truck life in miles and was set at 3, 3, 4, 6, 7, and 7 years for classes (1) to (6) respectively, in the report.

### Fixed Overhead Charges

An annual allowance of from \$300 for trucks in Class (1) to \$400 for trucks in Class (6) for non-productive salaries and expenses was made. A single truck operator driving his own truck was considered as being entitled to some remuneration to cover this item. Other items grouped under fixed overhead charges were allocated in such a manner as to take into consideration the various combinations of truck sizes and the number of units in the fleet.

Fixed overhead charges including salaries and expenses, garage and office rent, maintenance and utilities, tele-

phone, telegraph, office supplies, legal and auditing are shown in the final summation of costs.

Payment of taxes according to the California Unemployment Reserve Law and the Federal Social Security Acts amounts to \$4.05 per \$100 of payroll. For the truck classes under consideration, this group of taxes was set at \$54.85, \$54.85, \$54.85, \$55.80, \$55.80 and \$55.80.

A fair average rate of fire insurance for new and old units was set at \$1.40 per \$100 of value, using half the investment value. Similarly, the rate for theft insurance averaged \$0.25 per \$100 of value. The state laws require a coverage of \$5000 for property damage and liability. Totals for all types of insurance are included in the summaries.

The total rate charged for taxes and licenses including personal property, motor vehicle license, Board of Equalization permits and California Railroad Commission permit is included in the final summary on costs.

Total fixed costs are shown as Item 17 in the summaries. These results divided by Item 9, give the total fixed costs per mile and divided by Item 10, give the total fixed costs per hr.

#### Variable Costs

Dump trucks as now operated in California almost exclusively use gasoline for fuel. For the purpose of the present rate structure the price of gasoline was fixed at 13.5c per gal., including gasoline taxes. The following average figures for gasoline consumption were used:

TABLE D

	Class Numbers					
	(1)	(2)	(3)	(4)	(5)	(6)
Miles per gal.....	8.0	6.4	5.2	4.1	3.4	3.0
Cost per mile.....	\$0.01688	\$0.02110	\$0.02600	\$0.03295	\$0.03975	\$0.04500

An average cost of \$0.50 per gal. was used in computing the cost of lubricating oil per mile on the miles per gal. figures arrived at in the investigation. This relationship is shown in the following table:

TABLE E

	Class Numbers					
	(1)	(2)	(3)	(4)	(5)	(6)
Miles per gal.....	300	275	250	225	200	175
Cost per mile.....	\$0.00167	\$0.00182	\$0.00200	\$0.00223	\$0.00250	\$0.00286

Dump truck operation, as a whole, reflects a somewhat lower tire life than general transport hauling, due to the fact that the dump truck is often required to go over rough roads. With certain sizes there is a distinct tendency to overload the tires. The values established were as follows:

TABLE F

	Class Numbers					
	(1)	(2)	(3)	(4)	(5)	(6)
Cost per truck mile.....	\$0.0065	\$0.0080	\$0.0105	\$0.0142	\$0.0162	\$0.0202

From a study of cost records in southern California, the Commission's engineers give the following values for maintenance.

ing 5% of unproductive time for drivers, the average annual compensation in southern California for drivers would be \$1355 in Classes (1), (2) and (3) and

TABLE G

	(1)	(2)	(3)	(4)	(5)	(6)
Maintenance cost per mile So. Calif.....	\$0.0060	\$0.0095	\$0.0165	\$0.0210	\$0.0280	\$0.0340

They found that the labor charge in maintenance approximates 50% of its total cost.

The depreciation charges are shown on a mileage basis. These were computed from the average life data and are shown in the summaries. Taxes on gross income are an extremely variable item. Some operators have considerable income which is exempt from taxes of this category. The Commission assumed for purposes of rate establishment that average gross income would be equal to total cost of operations including drivers' wages. On the gross income, the Board of Equalization levies a 3% tax and the Railroad Commission a 1/4 of 1% tax. The amount of these charges for the several classes is given in the summary.

Total variable costs are shown in the summaries and are the summation of fuel, lubricating oil, tires, maintenance, depreciation and taxes on income. While the item of driver wages was not included in the studies as far as the hourly rates are concerned, they do affect the establishment of ton-mile rates. The Commission's order, which will be treated later, established minimum hourly rates exclusive of driver's wages, but provided that the mandatory additional charge for the driver, should not be less than the prevailing wage

\$1380 for classes (4), (5) and (6). In the northern California area these sums would be \$1257 and \$1325, respectively. (See Table H.)

#### Return on the Investment

At a hearing held prior to the Railroad Commission issuing its order, considerable testimony was introduced relative to a return on the investment. As a result of this testimony an additional allowance was made in an amount equal to 8% on one-half of the original investment which gave the figures shown in Table I.

Adding these allowances, the data converted to hourly costs is shown in Table J.

It is to be noted that the total charges per hour are exclusive of the drivers' wages. Compensation insurance costs based on the prevailing wage values adopted are included.

#### Costs Per Ton-Mile

Coincident with the study on hourly rates, the Commission made an extensive study of the haul problem from the ton-mile basis. Two major items received special emphasis—unloading and loading time and the effect of the length of haul on the ton-mile rate. In the matter of loading time, they established values of 20 minutes for class (1), 25 minutes for class (2), 28 minutes for class (3), 30 minutes for classes (4) and (5) and 40 minutes for class (6). In calculating costs for various lengths of haul (which determine the number of truck miles per day or year), it was necessary to vary the period of depreciation for each length of haul and for each class of truck. The accompanying tables show the ranges used.

#### ESTIMATED LIFE OF DUMP TRUCKS

Class No.	Estimated range of life in years	Estimated range of life in miles
(1)	5.0 to 3.0	45,550 to 145,908
(2)	6.0 to 3.0	44,070 to 124,557
(3)	6.5 to 4.5	43,355 to 170,820
(4)	8.0 to 5.5	43,136 to 163,812
(5)	8.0 to 6.0	43,136 to 169,506
(6)	8.0 to 6.0	33,640 to 160,308

#### Rate Order

After extensive hearings at which rock producers and independent truckers were heard together with the testimony of the Commission's engineers a decision was had. A brief outline of its contents will give the salient points.

The decision divided the state into northern and southern divisions for the

#### ROCK PRODUCTS

TABLE H—DUMP TRUCK OPERATING DATA FOR SOUTHERN CALIFORNIA

Item No.	General data.	(1)	(2)	Class (3)	Numbers (4)	(5)	(6)
(1)	Investment including body and hoist	\$1200.00	\$2400.00	\$3400.00	\$4000.00	\$5200.00	\$6200.00
(2)	Replacement cost of tires	150.00	285.00	325.00	445.00	590.00	685.00
(3)	Turn in or salvage value	180.00	300.00	340.00	300.00	320.00	380.00
(4)	Amount to be depreciated	870.00	1815.00	2735.00	3255.00	4290.00	5135.00
(5)	Miles per gal. fuel	8.0	6.4	5.2	4.1	3.4	3.0
(6)	Miles per gal. oil	300.	275.	250.	225.	200.	175.
(7)	Cost per gal. fuel	0.135	0.135	0.135	0.135	0.135	0.135
(8)	Cost per gal. oil	0.50	0.50	0.50	0.50	0.50	0.50
(9)	Average miles per year	25,000	25,000	25,000	20,000	20,000	20,000
(10)	Average hours per year	1,898	1,898	1,898	1,752	1,752	1,752
(11)	Estimated life of vehicle in miles	75,000	75,000	100,00	120,000	140,000	140,000
(12)	Estimated life in years	3	3	4	6	7	7
	Tonnage capacity	2.5	4.0	5.0	6.5	10.0	15.0
	Fixed costs per year						
(13)	Fixed overhead	381.00	416.00	447.00	469.00	495.00	515.00
(14)	Employment and social taxes	54.85	54.85	54.85	55.80	55.80	55.80
(15)	Insurance, vehicle	170.00	179.90	213.50	220.40	257.30	265.55
(16)	Licenses and taxes, vehicle	48.75	66.95	125.45	147.75	186.35	196.75
(17)	Total fixed costs, per year	654.60	717.70	840.80	892.95	994.45	1033.10
(18)	Total fixed costs, per mile	0.02618	0.02871	0.03363	0.04415	0.04972	0.05165
(19)	Total fixed costs, per hr.	0.3449	0.3761	0.4430	0.5040	0.5676	0.5897
	Variable costs per mile						
(20)	Fuel	0.0169	0.0211	0.0260	0.0329	0.0398	0.0450
(21)	Oil	0.0017	0.0018	0.0020	0.0022	0.0025	0.0029
(22)	Tires	0.0065	0.0080	0.0105	0.0142	0.0162	0.0205
(23)	Maintenance	0.0060	0.0095	0.0165	0.0210	0.0280	0.0340
(24)	Depreciation	0.0161	0.0242	0.0274	0.0271	0.0307	0.0367
(25)	Taxes (gross income)	0.0041	0.0048	0.0055	0.0068	0.0077	0.0084
(26)	Total variable costs	0.0513	0.0694	0.0879	0.1042	0.1249	0.1475
	Drivers' wages	1355.00	1355.00	1355.00	1380.00	1380.00	1380.00
	Gross income taxes	103.66	119.85	138.31	136.86	153.35	168.84

TABLE I

Item	(1)	(2)	Class (3)	Numbers (4)	(5)	(6)
Return on investment per year	\$48.00	\$96.00	\$136.00	\$160.00	\$208.00	\$248.00

TABLE J—AVERAGE COST PER HOUR, SOUTHERN CALIFORNIA

Item	(1)	(2)	Class (3)	Numbers (4)	(5)	(6)
Fixed overhead	\$381.00	\$416.00	\$447.00	\$469.00	\$495.00	\$515.00
Employment and social taxes	54.85	54.85	54.85	55.80	55.80	55.80
Insurance, vehicle	170.00	179.90	213.50	220.40	257.30	265.55
Licenses and taxes, vehicle	48.75	66.95	125.45	147.75	186.35	196.75
Return on the investment	48.00	96.00	136.00	160.00	208.00	248.00
Total fixed charges per yr.	702.60	813.70	976.80	1052.95	1202.45	1281.10
Fixed charges per day	2.962	3.431	4.117	4.806	5.492	5.850
Fixed charges per hr.	0.3702	0.4289	0.5146	0.6010	0.6865	0.7312
Variable charges per mile	0.0513	0.0694	0.0879	0.1042	0.1240	0.1475
Variable charges per hr.	0.6757	0.9171	1.1578	1.1895	1.4258	1.6837
Total charges per hr.	1.0459	1.3460	1.6724	1.7905	2.1123	2.4149

purpose of establishing minimum rates. It further created three classifications of dump truck transportation with reference to the nature of the work involved. The following schedule gives the rates now in force in Southern California.

Capacity of dump truck water level	Column A	Column B	Column C	Column D
2 cu. yd. or less	\$0.90	\$0.70	\$0.80	\$0.35
Over 2 cu. yd. to and including 2½ cu. yds.	1.15	0.90	1.05	0.40
Over 2½ cu. yd. and less than 3½ cu. yds.	1.50	1.10	1.30	0.45
3½ cu. yds. or over but less than 4½ cu. yds.	1.85	1.35	1.60	0.50
4½ cu. yd or over but less than 5½ cu. yd.	2.10	1.60	1.85	0.60
5½ cu. yd. to and including 7 cu. yd.	2.45	1.90	2.20	0.70

In computing rates for equipment in excess of 7 cu. yd. capacity, add 25c per cu. yd. per hr. to the rates for 7 cu. yd. equipment. The minimum hourly rates shall be determined by adding to the amounts set forth in the table an amount equal to the general prevailing hourly wages for a driver and/or helper for work of similar character in the locality where the work is performed.

(A) The minimum rates based upon column A apply to the transportation by dump

trucks of excavated material when loaded by power shovel or other power loading device, not from a commercial plant.

(B) The minimum rates based upon column B apply to the transportation by dump trucks of sand, rock, gravel, road building material, excavated materials, asphaltic concrete, decomposed granite, and stabilizing materials when loaded by hand and the average mileage of each truck does not exceed 8 miles per hr. per day during the hours such truck is operated.

(C) The minimum rates based upon column C shall apply to transportation by dump trucks of sand, rock, gravel, road building material, asphaltic concrete, decomposed granite, and stabilizing materials, except where transported or loaded under conditions specified in subdivisions A and B.

(D) In addition to the minimum rates hereinabove specified, there shall be charged and collected not less than the minimum rates based upon Column D for standby time, whenever any truck is held but not used for a period in excess of 30 min. at the point of loading or unloading of any one load, such standby charge to apply to all such standby time in excess of 30 min.

Tonnage rates for two classes of haul were established as follows:

MOTOR TRUCK RATE PER TON	Column A	Column B
For loading and unloading	\$0.120	\$0.170
Per mile	0.030	0.030

Rates on a ton-mile basis include drivers' wages. Except where otherwise

provided minimum rates to be charged shall be computed from the above table. Where the transportation is from a production plant to a railhead point within the production area and for rail shipment, the minimum loading and unloading rate shall, in all cases, be 5c per ton, in lieu of the rates prescribed above. Where deliveries are made from points of production served by rail, or contact is made to the rail line within the producing area and delivered to rail-head points, the minimum dump truck rates shall not exceed the rail rates or those of other common carriers for similar or comparable service; provided, however, a minimum charge of 12c a ton shall be added for truck deliveries over and above the rail rates, to cover the accessory services of loading and unloading. The minimum standby rates as shown in column D, of the hourly rate schedule, shall be charged when truck is held but not used in excess of 30 min. at the point of loading or unloading for any one load, the standby time to apply after the 30-min. period. The minimum rates shown in column A apply to dump trucks engaged in the transportation of sand, crushed, rock, gravel, cold road mixture (commonly called plant mix), asphaltic concrete, decomposed granite and road stabilizing materials. The minimum rates shown in Column B apply to dump trucks engaged in the transportation of dry batched mixtures of sand, rock and gravel.

On the petition of several producers an additional provision was included in the rate order. This provides that the shipper must maintain payments for transportation services rendered of not less than \$150 each for the maximum number of trucks in use during any one 30-day period. If shipments are made so that the truck earnings are in excess of this amount, discounts of 20 to 25% are allowed. If in any subsequent period the earnings drop below the \$150 per truck per month, the charges are to return to rates in the original order.

While the Commission does not claim jurisdiction over producers who are delivering their own products in their own or leased equipment its regulations do either directly or indirectly affect all operators in the state. Almost all have numerous occasions to either rent for hire equipment at times of peak sales, or in quieter periods they frequently rent out their own equipment. It is particularly interesting to note the effect of the rate structure on the market. Immediately following its establishment, quotations on the zone basis were materially raised. In some instances the established haul rates were equal to or greater than prices at which aggregates had been quoted delivered.

# SCREENING

# 3000-Pound Rocks

By LOUIS CASSAYRE

Superintendent, Basalt Rock Co., Inc., Napa, Calif.

THE PHOTOGRAPHS [incidentally, which won the second prize in Rock Products annual photographic contest—the *Editor*] reproduced on p. 59 of the January, 1937, issue illustrated a new screening plant built by the Basalt Rock Co., Inc., Napa, Calif., to accurately size quarry stone to be used for bank protection work, and known locally as rubble or rip-rap.

The usual method of production of rip-rap by this company, as well as most others, has been to use the shovel in the quarry to select the various sizes of stone required. With the advent of larger shovels (we use a 2½-yd. Marion electric) it was particularly noticeable that some means of mechanical segregation was required if anything like the potential capacity of the shovel was to be achieved.



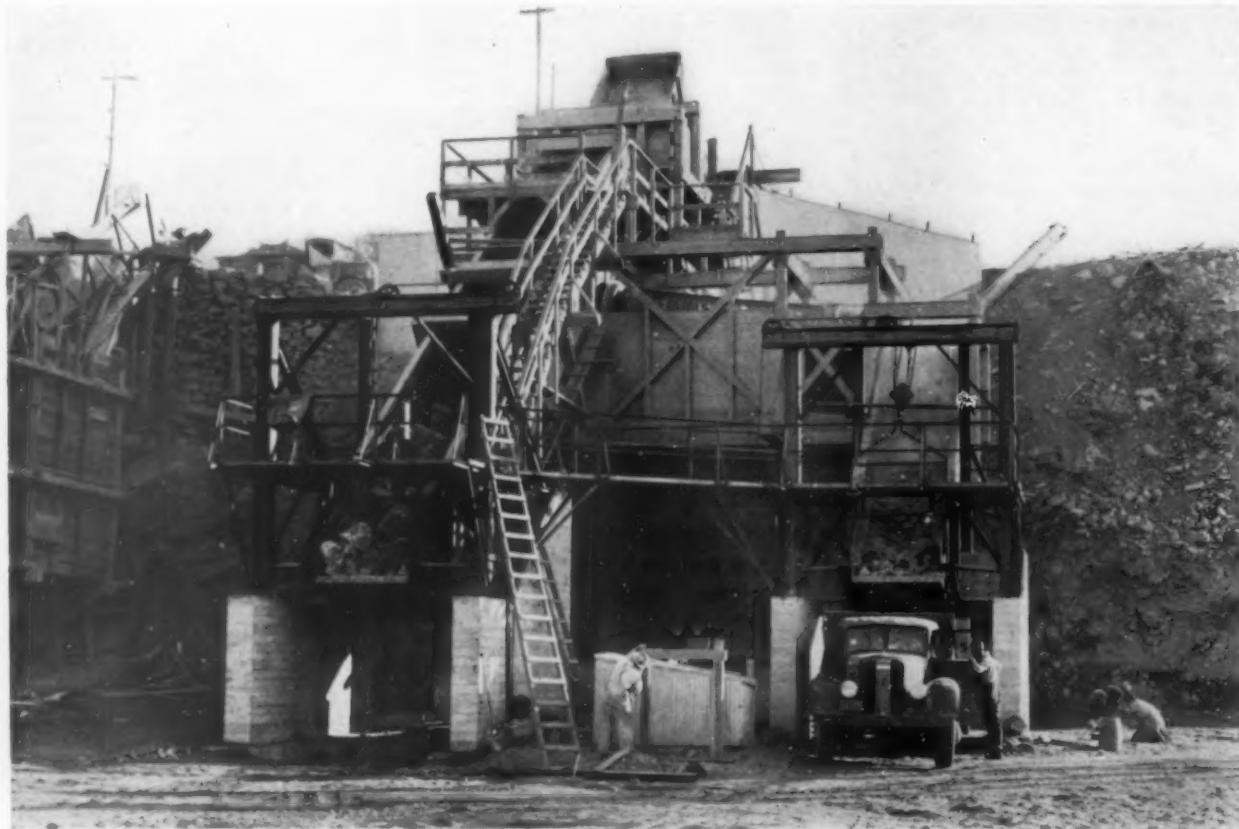
*"Tuning fork" grizzly with adjustable spacing*

While the production and sale of rip-rap cannot be considered as a daily commercial business, but rather as a contract business, the production in the

San Francisco bay area is largely in the hands of the commercial rock producers.

The usual sizes produced are "Class A" face rock from 1000 lb. to 5000 lb., "Class B" rock from 25 lb. to 1000 lb., with usually a stipulation of a certain percentage larger than 500 lb., and "Class C" rock from nothing to 500 lb. with the dirt removed. Then occasionally a specific job calls for special sizing and grading.

A recent large job called for material from 25 lb. to 150 lb. with no tolerance. It was the difficulty in meeting the last specification that prompted us to build a mechanical screening plant; together with the conviction that the way to produce all rip-rap, except "Class A" rock, which is large enough to be handled by the shovel (as indi-



New screening plant of Basalt Rock Co., Inc., at Napa, Calif., designed especially to produce rip-rap for river bank protection

vidual pieces), should be handled by digging the bank run material and putting it through mechanical segregation in a plant designed for this purpose.

Our quarry is operated on two levels with 45 ft. elevation between, and this elevation is the height of the new plant. The shovels load into the trucks which transport it a few hundred feet from the quarry face, and then dump into a hopper that holds 15 cu. yd., the bottom of which is a Link-Belt reciprocating feeder, 5 ft. wide and 10 ft. long, driven by a 15-hp. Fairbanks-Morse ball-bearing motor. This feeder has an adjustable stroke from 4 in. to 8 in. and has a capacity from 100 to 250 tons per hour. This feeder discharges on to a manganese tuning fork grizzly set at 35 deg. angle. This grizzly is adjustable by removing spacers between the individual manganese castings, which are small in section and tapered in every direction.

On the present work the grizzly is set at 13-in. spacings and this spacing determines the maximum size of material to go to a heavy duty rotary screen for further processing. The overs of this grizzly discharge into a rock loading chute the same width as the feeder and grizzly and 40 ft. in length, the bottom of which is 40 deg. from the horizontal, lined with  $\frac{3}{4}$ -in. plate on the sides and 30-lb. rail on the bottom, and closed at the bottom end with a power operated under-cut gate the full width of the chute. Trucks back to this chute, the gate is raised and lowered by power, a reversible slip-ring motor of 20-hp. with a solenoid brake is used to control the gate. The product of the chute is "Class B" rock.

The throughs of the grizzly (at the present time all stone smaller than 13 in., including fines) go direct to the 60-in. x 14-ft. heavy duty dredge type rotary screen manufactured by Link-Belt. A short section of the screen is 4-in. and the balance 7-in. circular openings. These materials are bunkered directly below the screen with a truck driveway under the bunker to waste the first material.

The discharge of this screen is into a second rock loading chute 5 ft. wide and 25 ft. long, the bottom of which has an under-cut gate identical with the "B" rock chute and controlled by a similar reversible hoist. The product of this chute, material smaller than 13 in. and larger than 7 in., round, is really one-man rubble and is being shipped for flood control work on the upper Sacramento River. Trucks take the material from either of the loading chutes, haul it a distance of one mile and back either over a ramp for railroad car loading, or over a ramp for river barge loading.

At the time this is written (December, 1936) the plant has only operated for a few days, but the quality of the material produced, and quantity handled by each shift justifies its construction.

The design of the plant represents the experience of the operating personnel of this company in collaboration with the engineers of the Link-Belt Co.

### Sand-Lime Block

WISCONSIN BRICK CO., Madison, Wis., manufacturer of sand-lime brick, recently began the manufacture of an 8x8x18-in. sand-lime building block. A Besser semi-automatic stripper block machine was installed late in 1936 to manufacture the units at the rate of slightly more than three per minute.

The machine was installed adjacent to the two 6 $\frac{1}{2}$  x 50-ft. long pressure steam curing cylinders used in the manufacture of sand-lime brick. About 8% hydrated lime is mixed with sand in the same way as for making sand-lime brick, with a slight increase in water content to facilitate tamping.

The mix is carried to the machine by an overhead conveyor extension from the regular brick mixer. With the high pressure curing cylinders, sand-lime block made one day are ready for shipment the next day. The cylinders hold about 1000 blocks each per batch. About 1000 units are made each 8-hr. day. Already, many small above grade jobs have been sold and units have been placed for exterior walls in a large warehouse.

Below are the results of tests made on three 8x8x18-in. three cell units by the College of Engineering, University of Wisconsin. The Wisconsin building code requirements are for an ultimate compressive strength of 700 p.s.i. at 28 days and an absorption not to exceed 12%. The results of the tests are as follows:

#### (A) COMPRESSION TEST DATA

	1	2	3
Mark or number	Not sealed		
Seal number	41.4	41.4	BB.E
Weight of block (lb.)	7.80	7.80	7.80
Height (in.)	7.75x17.70	7.75x17.70	7.75x17.70
Dimensions of loaded cross section (in.)	137.2	137.2	137.2
Area of section (sq. in.)	248.600	291.100	255.200
Maximum load (lb.)	1,810	2,120	1,960
Ultimate strength (lb. per sq. in.)			
Character of fracture—Pyramid shear in all cases.			
Remarks—Very dense.			
Date of compression test—August 22, 1936.			

#### (B) VOID TEST DATA

Mark or number	1	2	3
Section area (sq. in.)	137.2	137.2	137.2
Number of cells	3 rectang. cells	2 end depressions	same
Cell Dimensions (in.)	3.25x5.0	same	same
End depressions (in.)	1.5x5.0	same	same
Cell area (sq. in.)	63.8	63.8	63.8
Percent voids	46.5	46.5	46.5

#### (C) ABSORPTION TEST DATA (Weight in pounds)

Mark or number	1	2	3
Weight after immersion in water 48 hr.	44.7	44.9	44.0
Weight, dry specimen	40.3	40.7	39.3
Gain in weight	4.4	4.2	4.7
Percent absorption	9.8	9.4	12.0

### Sand-Lime Brick Production and Shipments

THE FOLLOWING DATA are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States. They may be considered representative of the industry.

Ten active sand-lime brick plants reported for the month of February, this number being one more than that reporting for the month of January, statistics for which were published in March.

### Average Prices for February

Shipping Point	Plant Price	Delivered Price
Milwaukee, Wis.	\$10.00	\$12.50
Pontiac, Mich.	12.50w	14.00w-15.00r
Detroit, Mich.	.....	15.00
Mishawaka, Ind.	0.25	.....
Syracuse, N. Y.	14.00w	16.00 -20.00
Saginaw, Mich.	10.50	.....
Madison, Wis.	11.50	13.00
Watertown, Mass.	.....	12.50

w = wholesale; r = retail.

### Statistics for January and February

	January <sup>†</sup>	February <sup>†</sup>
Production	2,088,190	1,972,235
Shipments (rail)	97,000	14,000
Shipments (truck)	1,532,370	1,714,580
Stocks on hand	2,240,971	3,435,662
Unfilled orders	1,820,000	3,365,000

<sup>†</sup>Nine plants reporting; incomplete, one not reporting unfilled orders.

<sup>†</sup>Ten plants reporting; incomplete, three not reporting unfilled orders.

### Sand-Lime Block

A Michigan producer reported shipments of 46,307 sand-lime block in February, with the price of the 8x8x16 size averaging 12c and that of the 8x12x16 size, 16c.

### Sand-Lime Brick Used

THE UNITED STATES POST OFFICE BUILDING, Philadelphia, Penn., recently completed, utilized 2,000,000 sand-lime brick in its construction. Grays Ferry Brick Co., Philadelphia, was the manufacturer.

# SOFT STONE ELIMINATOR

Specially Built for Consolidated Rock Products Co., Los Angeles, Calif., Gives Product That Passes Severe Rattler Test

By EDMUND SHAW

THE EDITOR promised more details of the soft stone eliminator and other improvements at the Claremont plant of the Consolidated Rock Products Co., Los Angeles, Calif., illustrated on p. 62 of the January Annual Review Issue. Here they are:

Plant No. 2 is in what is called the San Antonio wash. It ran for a good many years, but it has been shut down for some time because the deposit contained soft material, disintegrated granite, principally, in such quantity that it could not meet present-day specifications. In the early part of 1936 the plant was rebuilt and added to, so that it would make aggregate which would

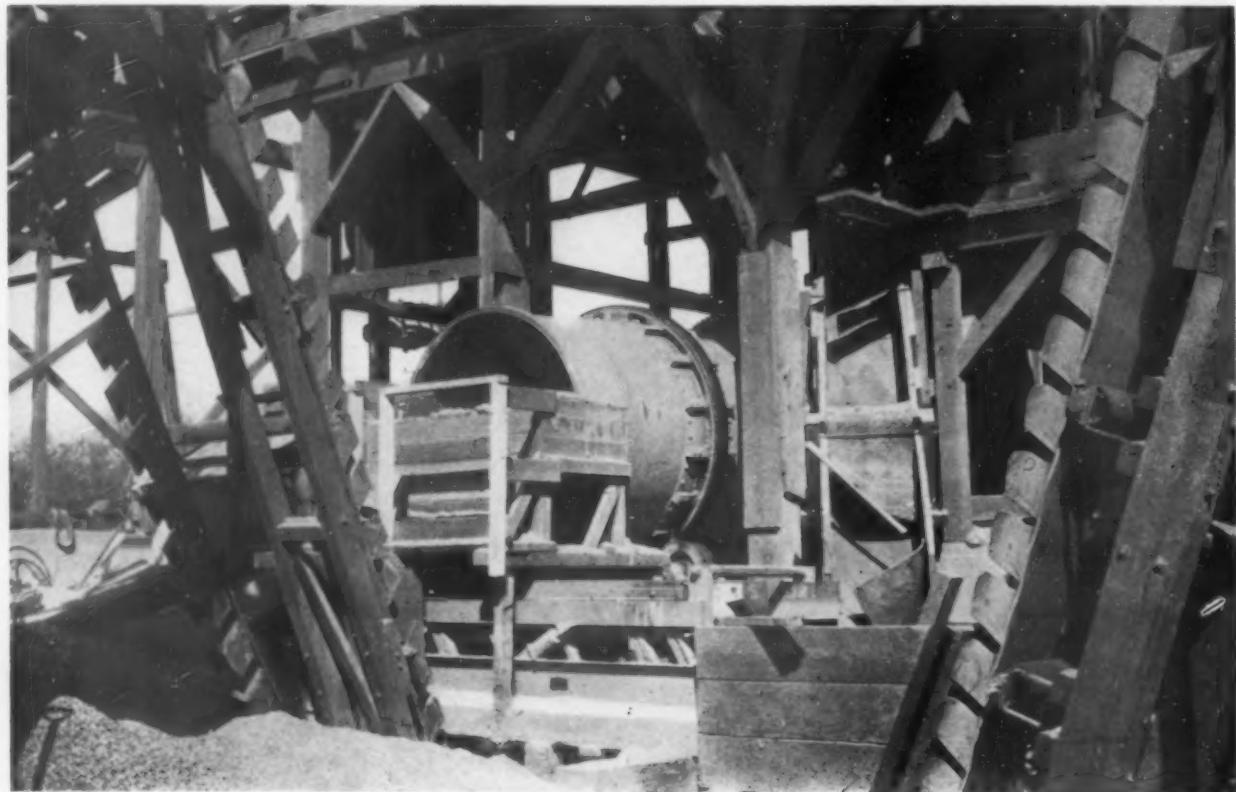
meet these specifications. The engineering department, headed by Harry Jumper, specification engineer, worked out a method of getting rid of the soft stuff so that an entirely satisfactory aggregate remains. It meets the rigid specifications of the Metropolitan aqueduct, in which most of the product is being used.

#### Peculiar Specification

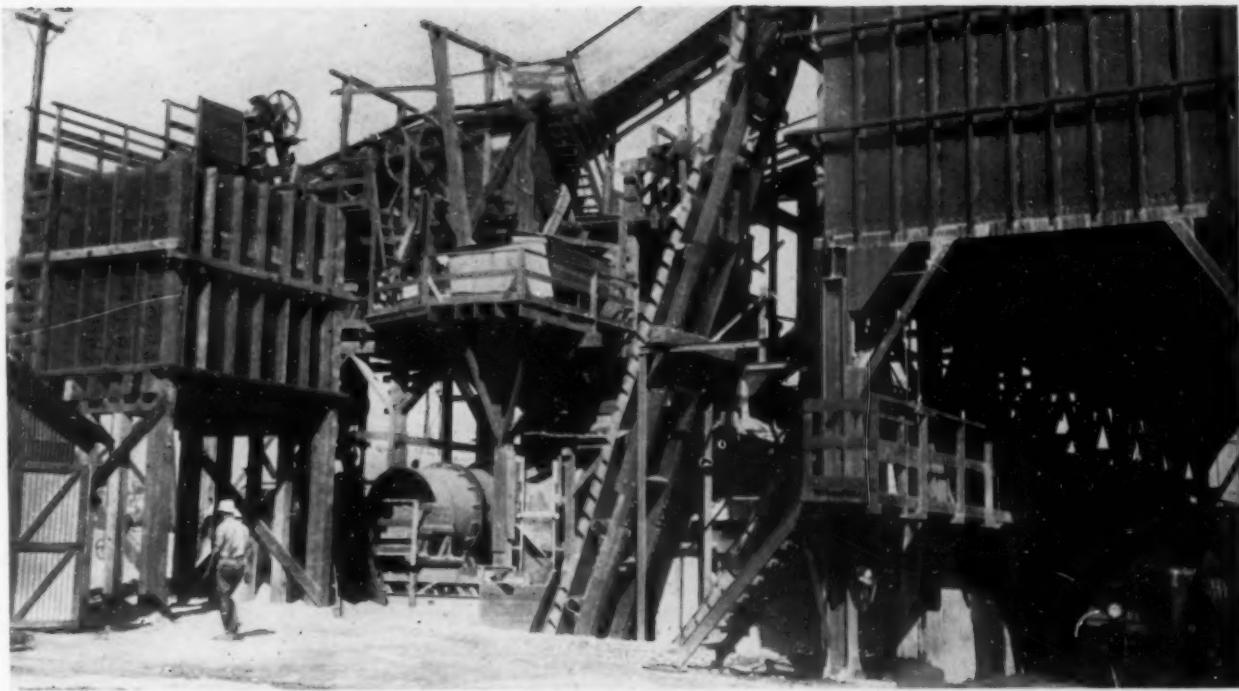
One of these specifications was responsible for the designing of the eliminator. This calls for not more than 15% of particles which show evidence of crushing in the product, a rather unusual requirement. When it was first

thought that the material from this deposit might be used, tests were made with a commercial machine which has given good results in Eastern plants. It eliminated the soft material, but it made so many pieces that showed fracture that the product would be rejected by the specification. The present device not only retains the gravel shape but it makes fewer broken sound pieces to be rejected by the screen following.

Figures tell the story. Los Angeles has a very severe "rattler" test for aggregates to assure that no soft stuff will be used in its public works. Formerly the material from this deposit showed losses from 38% to 42%. Now



The "rattler" at the Claremont, Calif., plant of Consolidated Rock Products Co.



A close view of the Claremont plant shows the improvements: Note soft stone eliminator and steel bins

the loss is from 27% to 28%, and this passes the city's specifications with a good margin.

#### Deposit—Method of Working

The bank is 45 ft. high, and an area close to 40 acres has been worked out. The operation resembles that of a stone quarry, a circular pit with a track running all around, close to the face. Excavation is with a No. 50B Bucyrus steam shovel. This discharges into 12-yd. Western side-dump cars, two to a train, which are pulled in by Whitcomb 8-ton gasoline - motored locomotives. There are two of these in service.

The track is standard gauge, with 65-lb. rails. Rails of 30-lb. and 45-lb. weight have been tried, but the track made with these would not hold the gauge a satisfactory length of time. And the lighter steel broke after a comparatively short service.

Approximately 40% of the bank material requires crushing to make the sizes needed, and about 33% of it is sand.

#### Processing

The cars are dumped to a track hopper from which the material is fed to the plant conveyor. This is 42-in. wide, 322 ft. centers. The rise of the belt is about 1 ft. in 3 ft. The discharge goes to a hopper above the primary screen, into which it flows by gravity.

This screen, of Worthington make, is of heavy construction. It is 6 ft. in

diameter and 20 ft. long. The inside cylinder has 6-in. round holes, the first jacket 3½-in. round holes, and the outer jacket has ½-in. wire mesh. Sizes between 6-in. and 3½-in. go to a 10-in. Worthington McCully crusher, and the oversize goes to a 20-in. crusher of the same make. The sizes between 3½-in. and ½-in. go to the "rattler", or soft stone eliminator, and the undersize of the ½-in. jacket joins them after they have passed the rattler and the screens that follow it.

The rattler discharge goes over a 3x6-ft. Symons vibrating screen, with a ¾-in. wire cloth. The undersize goes to a short elevator that lifts them to a bin from which they are run into a truck and are sent to waste. This is the soft material, broken up in the rattler so that it would pass a ¾-in. screen.

The oversize of this ¾-in. screen goes to a 24-in. elevator, 78-ft. centers, which raises it to a 4x14-ft. Symons screen with three decks, at the top of the plant. The uppermost deck has one section of 1½-in. holes, and one of 1¾-in. holes, both square. The middle deck has a 4-ft. section of 1½-in. holes, a 4-ft. section of ½-in. holes, and a 4-ft. section of ¾-in. holes, all square. The bottom deck has all sections of ¼-in. round holes. All the products except the minus ¼-in. go to bins, and that goes to the sand classifiers. When coarse gravel is not wanted, the over-

size of this screen, 3½-in. to 1¾-in., goes to a 4-ft. Symons cone crusher.

The products of the 20-in. crusher and the 10-in. crusher both go to a 24-in. elevator of 78-ft. centers, and are discharged into a Worthington revolving screen, 4 ft. dia. and 20 ft. long. The inside jacket has one section of 2¾-in. round holes and all the other sections have 1¾-in. round holes. The middle jacket has 1-in. square holes throughout, and the outside jacket has all ¾-in. square holes.

The oversize of this screen goes to the 10-in. crusher already mentioned, or the 4-ft. cone crusher, according to whether a coarser or finer product is wanted. The intermediate products go to bins, and the undersize of the ¾-in. jacket goes to the sand classifiers.

The discharge of the cone crusher goes to a 20-in. elevator, of 60-ft. centers, which discharges to a Worthington revolving screen, 3½-ft. dia., and 18 ft. long. The inside jacket has ¾-in. holes, the middle, ½-in. holes, and the outside ½-in. holes. The oversize goes back to the crusher and all the other products go to bins. They are mostly used for bituminous paving and are shipped by truck to a hot mix plant not far away.

The elevators in this plant are very solidly built. They all have 26-in. belts with 24-in. heavy steel buckets, close connected. Both elevator and conveyor belts are, with one exception of "Pio-



*View of the plant from the southwest*



*About 35,000 tons are carried in storage*

neer" make, a Los Angeles product. Screens are of both manganese and high-carbon steel. The latter is said to give very good service on this material.

#### **Soft Stone Eliminator**

Naturally, the most interesting feature of this plant is the soft stone eliminator, or rattler. This is a cylinder 20 ft. long and 6-ft. diameter, made of  $\frac{3}{8}$ -in. steel plate. It is reinforced with

angle iron circles on the outside and it is lined throughout with old screen plates of manganese steel. The drive is through a ring gear and pinion. The feed end has an opening just large enough to take in the feed spout, but the discharge end is entirely open.

Inside the cylinder are five 6-in. angle irons, running the entire length and spaced equally around the circumference. They are heavy and are braced at intervals on the inside. Their pur-

pose is to lift the material, and they are so wide that they lift more and lift it higher than the ordinary lifters in a washer or scrubber. It is the fall of the soft pieces, and the blows they receive from falling harder pieces, that breaks them so that they will pass a  $\frac{3}{8}$ -in. screen.

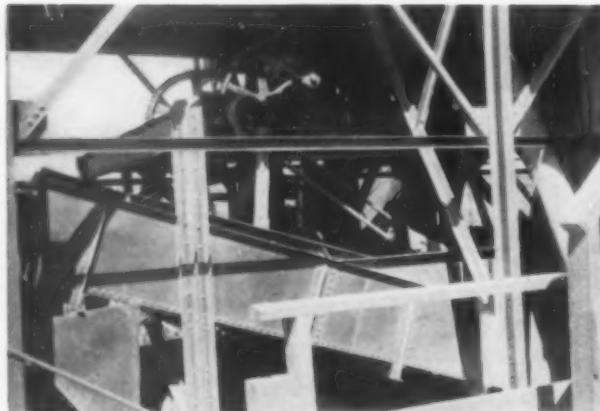
The drive is from a 50-hp. motor belted to a jack shaft, and this is belted to the pinion of the ring gear. The speed is 20 r.p.m. The cylinder is



*Spouts under bins are closed by flat sliding plates through levers from gallery*



*Deck over bins. Shaking screen in front; revolving screen, in the background*



*The sand classifiers are of the rake type*



*Gas locomotives and 12-yd. cars at track hopper*

mounted on two tire and trunion mountings, set with an inclination of 1-in. per foot toward the discharge end.

The soft pieces which have to be eliminated are found only in the gravel sizes. The pieces above 3½-in. diameter are of very hard rock, and these are taken out at the primary screen. But there are enough hard pieces in the 3½-in. to ½-in. sizes fed to the rattler to break the soft pieces completely. About 35% of the tonnage is all that has to pass through the rattler.

Mr. Jumper says that there must be the right proportions of hard and soft materials for this method to work satisfactorily. It was tried on material from another deposit belonging to the company without results that would justify installing it.

#### Sand Processing

The sand requires no treatment as it is all of good, firm grains. It is recovered in two 5-ft. Stephens-Adamson classifiers, of the type that rake out the settled sand.

About 700 g.p.m. of water is used for washing, the greater part being applied as sprays on the screens. It comes from a deep well on the property, and is pumped by a locally made deep-well pump.

#### Storage Facilities

The storage facilities are ample to meet all conditions. There are two steel bins, 150 tons capacity, erected when the plant was rebuilt, and the original wooden bins. Products may be loaded from any bin into either trucks or railroad cars, but much the greater part of the production is shipped by trucks. About 35,000 tons are carried in ground storage, and the yard will easily store 100,000 tons. Trucks and cars are loaded from this storage by two cranes, a Brownhoist with a 1-yd. bucket and a Northwest with a ¾-yd. bucket.

The main office of the Consolidated Rock Products Co. is in Los Angeles, and this is the only one of a number of plants that this company owns and operates in southern California. H. H. Robertson is superintendent of the Claremont plant.

The plant has a capacity for 200 tons per hour. Much of the product goes to a concrete pipe plant nearby, at which the large pipes for the Metropolitan aqueduct are being made.

#### Ice Damage

CLIFTON SAND AND GRAVEL CO., Clifton, Kan., recently suffered damages to its sandboat, due to ice jams in the Republican river which caused it to submerge.

#### Reinforced Concrete Bins

CLEAR LAKE SAND AND GRAVEL CO., Clear Lake, Iowa, has completed the construction of new reinforced concrete storage bins of 500 ton capacity.

#### Wage Increase

GREAT LAKES SEAMEN are to receive wage increases as provided in a contract recently signed with the Sand and Stone Boat Operators Association, operating sand and stone boats on the Great Lakes. The contract, which is for a year, will provide for increases for 1100 seamen.

#### Reorganization

MARIBEL GRAVEL CO., Rosecrans, Wis., formed in March, 1936, has been dissolved but will continue in operation as a partnership. The dissolution notice was signed by president H. A. Bruss and W. W. Bruss, secretary-treasurer.

#### Flood Aftermath

PORSCHEMOUTH SAND AND GRAVEL CO., Portsmouth, Ohio, will rebuild its sand tipple, which in the past four years had been damaged from each of three floods.

#### New Gravel Concern

COTTON GIN POST SAND AND GRAVEL CO., Aberdeen, Miss., a new concern, has applied to the War Department for a permit to dredge about 25,000 cu. yd. of gravel from the Tombigbee river near Amory, Miss.

#### Modernizing

MISSOURI-ILLINOIS MATERIAL CO., St. Louis, Mo., is reported to be building a new and modern aggregate plant.

#### Building New Dredge

A. H. SMITH, Branchville, Md., is building a new steel-hull, ladder-type dredge, for production of commercial sand and gravel. The dredge will be powered by a 450-hp. Diesel engine through a 100-hp. electric motor.

#### \$100,000 Sand and Gravel Plant

PORTLAND SAND AND GRAVEL CO., Portland, Penn., has started construction of a new sand and gravel plant on the Creek road near Portland. A new all-steel structure is to be erected to replace a large wooden plant at the site. William Seguine, Kentville, N. J., is president; I. W. Wortman is secretary; and D. J. Miller, Bangor, Penn., is assistant secretary and assistant treasurer.

#### Another Plant

SMILEY SAND CO., Atlanta, Ga., began operations at Hickman, Ky., in March when its first barge loads of sand and gravel were unloaded and reloaded into railroad cars, to be used in road building in West Tennessee. About 25 men will be employed at this plant, one of several operated by the concern, under the supervision of Jack Gibbons.

#### Appeal Zoning Decision

UNITED SAND AND GRAVEL CO., Morrisville, N. J., has appealed the decision of the Zoning Commission in refusing a permit to the company to resume operations of its gravel pit in the borough. A permit had been refused the company on the grounds that the present zoning laws would be violated, since the plant was in poor condition and had apparently been closed. Officials of the gravel concern contended that while the plant had not been in operation from 1929 to 1936, a watchman was always kept on the premises and the operation had not been abandoned.

#### Challenge Insurance Increase

PRICE SAND CO., Tulsa Okla., and YAHOLA SAND AND GRAVEL CO., Muskogee, Okla., have joined the Associated Industries of Oklahoma in a supreme court test case challenging the right of the state insurance board to raise rates without a hearing. The suit requests that the court issue an order prohibiting all insurance increases, insisting that rates were already prohibitive.

#### Another Precaution

CITY OF MIAMI, OKLA., is reported to have caused the arrest and penalty by fine of five local truck drivers for negligence in permitting gravel to scatter on city streets, after a warning had been made. Loose gravel on pavements was cited as being a traffic hazard.

#### Power Plant Fire

COOLEY GRAVEL CO., Chillicothe, Mo., will rebuild its power plant, which was damaged to the extent of \$5000 in a recent fire.

#### Enlarges Facilities

GRANT-SERVICE ROCK CO., Fresno, Calif., has purchased the Thompson Construction Co. holdings. Properties involved in the sale, which was estimated at \$100,000, include two asphalt plants, a rock crusher, transit-mix plants, cranes, trenchers, a fleet of trucks and other equipment, along with 20 acres of land. R. F. Felchin is president and A. R. McMillan, manager.

# *Chemists' Corner*

Resumé of Literature and an Example of Modern Trends in Making  
Special Cements for Sea-Water Resisting Construction

## Cements and Sea Water

By ALTON J. BLANK,

General Superintendent and Supervising Chemist, Cementos Atoyac, S. A., Puebla, Mexico;  
also Chemical Director, Cement Process Corporation

DURING the past two hundred years considerable has been written of the destructive action of sea water upon mortar and concrete.

Kuhlmann (1), writing on the subject of solids immersed in water, has the following to say: "When a solid body, of any degree of porosity, is immersed in water or any other fluid, it rapidly absorbs a certain quantity of the fluid, until the point of complete saturation is reached; and if, in addition, the fluid possesses reactive powers, certain chemical changes will ensue within the pores of the solid body."

Due to the nature of the work, concrete as placed in sea water is seldom impermeable throughout, and as a result the sea water acting upon the concrete by filling in the pores and interstices has a tendency to precipitate the salts and dissolve out some of the lime, resulting in a change of volume and eventually producing partial or complete disintegration of the concrete.

Perronet (2), as early as 1782, specified a mortar composed of 1 part lime to 2 parts artificial puzzolana for bridges, canals, docks and other constructions exposed to the action of water. Smeaton (3), describing his experiments in connection with the construction of the Eddystone lighthouse found mortars composed of puzzolana with lime to be the most resistant to sea water. Smeaton was, incidentally, probably the first English engineer to employ puzzolana with lime. From 1820 through 1840 Vicat (4), Treussart (5) and Rancourt (6) deduced from their investigations and experiments that for sea water construction the natural hydraulic limes should be used if possible; but if they could not be procured, then pure lime mixed with puzzolana was preferable to artificial hydraulic lime. In finding that the disintegra-

tion of mortars in sea water was due principally to the action of magnesium sulphate on lime, they also recommended the use of clays that had been subjected to the proper degree of calcination for use in expediting the hardening of lime to give similar results to those obtained from the use of natural puzzolanas. Chatoney (7) and Rivot later found mortars derived from a mixture of natural puzzolana and fat lime to be best suited, admitting, however, that the Roman engineers were more successful in the employment of natural puzzolanas than other engineers.

Ravier (8), in 1854, reported that his investigations covering mortars of fat limes and Roman puzzolanas in sea water showed that not only the free lime present in the mortar, but the lime combined with silica, as well, was subject to attack. Vaillant (9), in 1856, after a series of investigations reported that the natural puzzolana mortars used by the Romans for submarine constructions, were still in a perfect state of preservation. Februrier (10), later concluded from numerous experiments, that mortars of fat limes and trass, also ordinary artificial hydraulic limes, or naturally feebly hydraulic limes, even when mixed with feebly hydraulic puzzolanas, were not resistant to sea water action, and believed that only the double-burned artificial hydraulic limes, or the natural hydraulic limes that approached the limits of cements, were capable of resisting this action.

Tostain (11), writing in 1857 of his inspection of various Mediterranean and other ports, found partial alterations in all concrete sea work that he saw. Faija (12), reporting in 1888 on a number of experiments, considered that sea water had no deleterious action on sound and properly used port-

land cement and cited, apart from the Aberdeen Graving Dock failure in 1887, forty years' use of portland cement in marine work without marked failure. However, Smith (13), writing on the effect of sea water upon portland cement constructions in 1891, cited a number of failures and concluded that the cause of expansion and disintegration of the concrete was due to the chemical reaction between the whole of the lime in portland cement and the acid and basic constituents of sea water which replaced the cement with a bulkier and non-cementitious compound of sulphuric and carbonic acids, magnesia and lime.

Durand-Claye (14) and Debray, writing in 1889, considered that when concrete was exposed to the action of sea water, destruction was caused by expansion due to the formation of crystallized sulphate of lime, and that magnesia had little effect. Feret (15), writing of his experiments in 1892, found it fairly well established that magnesium sulphate was the only injurious substance in sea water. Leduc (16), in 1904, carried out an extensive series of tests with hydraulic limes and cements, with and without the addition of puzzolana, and determined that sea water had less action on those mortars and cements containing puzzolana. Michaelis (17), writing in 1909, believed the destructive action of sea water to be attributed to the effect of the sulphates it holds in solution, which, reacting with the lime and alumina present in the cement, form calcium-sulpho-aluminate—"the Cement Bacillus." During formation this undergoes enormous expansion, rupturing and softening the hardest mortars. Aside from suggesting a lower alumina content for the cement, he suggests the use of puzzolana.

Potter (18), after a series of experiments in 1909, concluded that the damage to concrete was caused by magnesium salts in the sea water acting on feebly combined lime and alumina, and forming calcium sulphate and alumina compounds, which, on taking up water of crystallization, do the bursting of concrete. Of the various mixtures he experimented with in connection with portland cement clinker, he found that a mixture composed of 6 parts burned red brick ground with 10 parts clinker gave the best all around results and the most resistant product. Bates, Phillips (19), Wig, in 1912, found chlorides to be more active than sulphate solutions on cements, but that disintegration is caused by the mechanical force exerted by the crystallization of a salt in the pores of the material.

Thus, with all of the pro's and con's as to why cements, portland or otherwise, are attacked by sea water, the fact remains that they are attacked, some more than others, and until a cement 100% resistant to sea water is eventually designed, only those cements showing the greatest resistance should be employed in concrete work of this kind.

As far back as 1858, Minard (20), writing of his and other investigations in this connection, made a most important statement, namely, "The only means of knowing the action of the sea on a new cement or mortar is to immerse it in the sea, in the locality where it is to be used. Substituting chemical operations in laboratories for the sea itself, only involves us in new disasters." Present day investigators would do well to carry out these thoughts, for results obtained in the laboratory and in the field are never the same.

Recently the writer, acting upon the suggestion advanced by Minard some seventy-five years ago, has carried out an extensive series of tests involving the action of sea water upon the new Atoyac brand of cement, and upon three other brands of portland cement that are produced in Mexico.

In carrying out these tests four different samples of each brand of cement were obtained from time to time. In the investigation of each brand of cement, 1:3 sand briquettes were made up (a) with normal water obtained from the Puebla city supply, and (2) with sea water obtained from the Port of Veracruz. Those briquettes made up with normal city water were stored in normal city water during the test period, while those briquettes made up with sea water were stored in sea water for the period of test. In each case fresh supply of normal and sea water was placed in the briquette storage tanks every week.

Tensile strengths of specimens stored in sea water at end of six months averaged 94% of the strengths of specimens stored in fresh water for No. 1 cement; 84% for No. 2; 88% for No. 3; and for Atoyac cement, 95%.

Perusal of test data shows that some cements are better adapted for use in sea water than others. Data do not show that any of the cements tested are 100% resistant to the action of sea water, but they do show the Atoyac type of cement to be attacked to a lesser extent than the three brands of portland cement. Many of the portland cements in use at this time are unsuitable, and it is useless, in view of the scores of failures of portland cement concrete in sea water constructions all over the world, for portland cement manufacturers to continue to insist that portland cement is the ideal product for this type of construction.

It is believed that cements of the Atoyac type will be especially designed in the future to offer the greatest resistance to the action of sea water. In this connection portland cements can only improve their position by blending with trass, puzzolana and other materials rich in silicic acid, which ingredients will have a tendency to combine with the superfluous lime present in portland cements, and create more stable compounds with the alumina and iron oxide contents present. Once this step is taken, the product is no longer a portland cement under the carefully safe-guarded specifications for portland cement as now exist.

A cement 100% resistant to the action of sea water will eventually be had, but it will not be a cement that will pass present specifications for portland cement.

#### References

- (1) M. Fred Kuhlman: "Mémoire sur les Chaux Hydrauliques, les Ciments et les Pierres Artificielles." 1841.
- (2) M. Perronet: "Description des Projets et de la Construction des Ponts de Neilly, de Mantes, d'Orléans et Autres. du Projet du Canal de Bourgogne, etc." 1782-3.
- (3) John Smeaton: "A Narrative of the Building and a Description of the Building of the Eddystone Lighthouse with Stone." 1791-3.
- (4) Louis Joseph Vicat: "Recherches sur les Causes Chimiques de la Destruction des Composés Hydrauliques Par l'Eau de Mer et sur les Moyens d'Apprécier leur Resistance à cette Action." 1857-58.
- (5) General Treussart: Mémoires sur les Mortiers Hydrauliques et sur les Mortiers Ordinaires." 1829.
- (6) Colonel Rancourt de Charleville: "Traité de l'art de Faire de Bons Mortiers Précedé des Expériences Récentes sur les Chaux de France et de Russie." 1822-8.
- (7) Chatoney & Rivot: "Considerations Générales sur les Matériaux Employés dans les Constructions à la Mer." 1856.
- (8) M. Ravier: "Observations and Experiments Upon the Mortars Employed in the Sea at Algiers." 1854.
- (9) Marshall Vaillant: "General Considerations upon Hydraulic Materials used for Constructions in the Ocean." 1856.
- (10) M. Féburier: "Experiments at St. Malo upon Various Limes, Puzzolanas, etc."
- (11) M. Tostain: "Inspection of Ports on the Mediterranean, in France, Algeria, Corsica and Italy." 1857-8.
- (12) Henry Faixa: "On the Effect of Sea Water on Cement." 1888.
- (13) William Smith: "The Influence of Sea Water upon Portland Cement Mortar and Concrete." 1891-2.
- (14) Ch.-Leon Durand-Claye and Paul Debroy: "The Permeability of Cement Mortar and its Decomposition by Sea Water." 1888.
- (15) René Feret: "On the Density of Hydraulic Mortars." 1892.
- (16) E. Leduc: "Action de 18 Eaux de Mer sur les Mortiers." 1904.
- (17) Dr. William Michaelis: "Der Erhartsprozess der Kalkhaltigen hydraulisch Bindemittel." 1909.
- (18) Charles J. Potter: "Chemical Changes in Portland Cement Concrete and the Action of Sea Water Thereon." 1909.
- (19) P. H. Bates, A. J. Phillips and Rudolph J. Wig: "Action of the Salts in Alkaline Water and Sea Water on Cement." 1912.
- (20) M. Minard: "Annales des Ponts et Chausées." 1858.

#### New Process Cements

Without going into any great detail as concerns the procedure followed in the manufacture of the special cements referred to in the foregoing, which has been amply covered in previous articles, it may be merely stated that "caustic lime is hydrated in the presence of siliceous and/or argillaceous materials, and the reacted mixture, with the addition of portland cement clinker and its gypsum content, is ground to the desired fineness under conditions which involve the control of heat and moisture." In the production of the masonry product, Plastocement, about 10% of portland cement clinker is added after the preliminary hydration stage and prior to the fine grinding stage of the process, as an energizer. In the production of Atoyac cement the addition of portland cement clinker is about 65%. In either case, the amount of portland cement clinker added is determined by the kinds of materials used and the control exercised during the manufacturing procedure.

As an example it may be stated that the Plastocement being produced at a plant in Central America, whereby only 2% of portland cement clinker is used as an energizer, has approximately the same setting and strength qualities that are had with the Plastocement being produced in Mexico where about 10% of portland cement clinker is used.

S. L. Meyers, in his article dealing with new cements (Chemists' Corner of the January, 1935, issue of Rock Products), concludes, after having made tests upon one bag of Plastocement, which he secured in the open market, that 36% of portland cement clinker is used in making the product. His private source of information (probably the same that supplied the bag of Plastocement) assures him that 40% of clinker is used.

It is a conceded fact that cements, regardless of the type, vary considerably as to chemical composition and quality. There are no cements produced today that are absolutely uniform in these respects, from day to day and year to year, although some cements are more uniform than others.

In the production of Plastocement the caustic lime is proportioned by means of an automatic feeder; the siliceous material by means of a Poidometer, and the clinker addition also by means of a Poidometer. Notwithstanding these measuring or weighing devices, the actual weights of these materials are checked a number of times daily by the supervisor in charge of the production of the cement.

#### Chemical Analyses of Cement Not Dependable

With the exception of a great number of experimental cements that have been produced of the Plastocement type, from time to time, Plastocement has never, during the several years it has been produced, contained in excess of 15% of clinker, and perusal of daily chemical analyses over this period of time does not reveal that there was ever 31.60% of silica in the product, which amount Mr. Meyers claims for the sample tested. The attempt on the part of Mr. Meyers to calculate the amount of each material going into the final product, from its chemical analysis, is also a waste of time and void of reliability. Any chemist who has tried to calculate a cement analysis from the analysis of the raw materials, or vice versa, has found that his theoretical calculations vary considerably from the actual analysis, and are undependable. Even were there some relation, it would still be impossible for Mr. Meyers to calculate the composition of a cement of the Plastocement type without first having complete analyses of all the materials that go into its manufacture. Textbook analyses of limes, sands, clays, etc., do not help one in arriving to that end. This applies as well to calculations that may be made from the amount of soluble silica present in a finished product, or its sulphur trioxide content, or its specific gravity. This most particularly applies to calculations that may be made from microscopic examinations.

For Mr. Meyers to state that his microscopic examinations show the siliceous material to be clear and unetched, and that therefore no reaction was had with the lime, is a broad statement that can hardly be accepted. In the first place, it is a physical impossibility for any person to examine all of the fine or finest particles of sand

TABLE 1: INSOLUBLE RESIDUE AND SPECIFIC GRAVITY AT VARIOUS STAGES OF PLASTOCEMENT

	(A)		(B)		(C)		(D)
	Insoluble residue	Specific gravity	Insoluble residue	Specific gravity	Insoluble residue	Specific gravity	Insoluble residue
No. 1	26.20%	2.34	24.40%	2.36	19.20%	2.63	11.50%
No. 2	26.00%	2.29	23.00%	2.33	19.90%	2.63	15.00%
No. 3	25.40%	2.39	22.60%	2.44	18.40%	2.64	12.80%
No. 4	22.30%	2.23	21.00%	2.31	16.20%	2.53	10.40%

present in such a cement. It is furthermore impossible, from microscopic examinations, to clearly determine the reactions that have taken place in the production of a cement, and their bearing upon the compound composition and qualities of the product. If over one hundred years of research on portland cement has failed to result in any universal agreement as to the compound composition of this cement, and the function of the compounds insofar as their contribution to this or that quality of this one cement, it is hardly possible that the casual examination of a cement of the Plastocement type, and the conclusions formed, will constitute any great contribution to the cement manufacturing art.

The writer has never attempted to explain the reactions that are had, and the compounds that are formed during the process under which these new cements are manufactured. Neither has he tried to theorize as to what compounds are formed when the dry powder is mixed with water, and the mass sets and hardens. Whatever the reactions may be, and whatever compounds are formed, they are desirable ones, for setting and strength properties are had in the product. The fact that a 10% addition of clinker to the product for energizing purposes results in the final product having an eventual strength equal to or greater than that of standard portland cement, is sufficient proof that desirable compounds are formed.

#### Lime-Silica Reactions in Hydration of Cement

Constant tests that have been made upon the lime-siliceous mixture prior to, and following the hydration and the grinding stages of the process, as well as upon neat test pieces, have definitely shown that reactions between the lime and silica start during the hydration procedure, and are furthered during the grinding stage of the process, while tests made upon neat test pieces at

ages up to two years show that these reactions continue.

In Table 1 are shown insoluble residue and specific gravity tests made upon mill samples of Plastocement mixtures containing approximately 75% caustic lime with 25% siliceous material in which (A) are results obtained on the initially proportioned material mixture; (B) upon the mixture after hydration and on being discharged from the hydrator; (C) upon the final product after having been ground under conditions of control involving heat and moisture and on being discharged from the mill; and (D) upon neat test pieces consisting in 6-in. x 12-in. cylinders that have been stored under water two years:

From the above tests it is apparent that there is a substantial reaction between the lime and silica during the hydration of the lime, and that this reaction is furthered to a considerable extent during the grinding procedure. Tests upon the neat test pieces at the age of two years show these reactions to continue.

Were no reactions taking place, the product would be void of setting and strength properties, however, perusal of the tests shows that approximately 8% of the total silica present in the initial lime-silica mixture enters into combination with the lime during the hydration procedure; 34% of the initial silica has entered into combination with the lime through the grinding procedure; 53% of the initial silica has entered into combination with the lime after neat test pieces have been allowed to age up to two years.

Perusal also shows that the initial specific gravity of the lime-silica mixture is increased 2% as a result of the hydration treatment; 11% after having been ground in the mill under controlled conditions of heat and moisture.

Further tests made upon Atoyac cement that was composed, roughly, of 75% siliceous material and 25% caustic lime, to which about 65% Portland ce-

TABLE 2: INSOLUBLE RESIDUES OF FRESH ATOYAC CEMENT AND NEAT CYLINDERS 1 YEAR OLD

Sample	Insoluble residue in fresh cement as discharged from the mill	Insoluble residue in neat 6-in. x 12-in. cylinders that were aged 1 year in water
No. 1	15.50%	6.00%
No. 2	12.00%	8.20%
No. 3	13.50%	9.00%
No. 4	13.50%	9.20%
No. 5	15.00%	9.50%

ment clinker was added prior to the grinding stage, as an energizer, are shown in Table 2:

Perusal of the foregoing tests shows that about 40% of the insoluble material present in the Atoyc cement as discharged from the mills, enters into combination with the lime in neat test pieces that have been allowed to age in water for a period of one year. The fact that this cement has greater strength than standard portland cement, though containing only 65% clinker, is further proof of the reactions had between the silica and lime present in the cement.

Incidentally, experiments made with a great many materials, including limes made from high and low calcium limestone, cement-rock and dolomites, when used with various kinds of siliceous or argillaceous materials, have shown that there is no standardized rate of reaction during the hydrating and grinding procedure of the process. Variations in the kinds and proportions of materials used, together with variation in the control exercised during manufacture, result in a variation in the ultimate product. Each plant, with its variety or variation as to materials and equipment, in its desire to manufacture a given type of cement under the process in question, must of necessity carry out a number of experiments, and matters are facilitated when these experiments are transferred from the laboratory to the mill.

### Contracts for Cement Plant Docks

GULF PORTLAND CEMENT CO., Houston, Tex., a new concern, awarded the contract for the construction of the bulkhead and docks, for the plant to be built, to the Austin Bridge Co. The docks will be 82 ft. long and 16 ft. wide. The contract for the electric wiring was awarded to the Westinghouse Electric Co. The cement plant being built on the ship channel at a cost of \$400,000 is to be completed by June 1.

### In Operation Again

UNIVERSAL ATLAS CEMENT CO., Northampton, Penn., plant resumed operations March 1 after several months inactivity. Employees went back to work with an hourly increase in wages.

### New Cement Plant in India

ASSOCIATED CEMENT COS., LTD., is planning to erect a cement plant at Central Punjab with an output of 100,000 tons a year, according to a report from Bombay. The plant is expected to be in full production early in 1938. Plans are also in progress for a new plant at Sind.



Curing tank, at left, and air conditioner, at right, in Pennsylvania-Dixie's constant temperature room, Richard City, Tenn.

### Water Temperature Regulator

**I**N ORDER to bring the water, in which the test briquettes and cylinders are submerged, to the temperature of the constant temperature room as rapidly as possible, water to be poured into the tank is passed through a Ford model "T" radiator mounted at the head end of the tank, at the laboratory of the Richard City, Tenn., plant of the Pennsylvania-Dixie Cement Corp. This radiator is connected to the water supply and a 1-in. pipe leads from it to the tank. A hand valve controls the flow of the water from the radiator through this pipe to the tank, and a similar one from the main to the radiator. These valves are set so that a constant drip of water takes place, making it possible to bring in additional water (for evaporation losses, etc.) without affecting the temperature of the water in the tank. The use of the radiating surface has eliminated some delays and has made the temperature of the water "self-regulatory."

### Cement in Paper Sacks

THE BRITISH COLUMBIA CEMENT CO., LTD., Victoria, B. C., is discontinuing the use of jute sacks and will pack all cement in paper sacks to eliminate the expense of packing and returning sacks. There will be no extra charge to the consumers for sacks.

### February Statistics

PORTLAND CEMENT INDUSTRY in February produced 5,837,000 bbl., shipped 5,163,000 bbl. and had in stock at the end of the month 25,069,000. Production and shipments showed increases of 68.0 and 62.5% respectively, as com-

pared with February, 1936. Stocks at mills were 9.1% higher than a year ago.

The statistics here given are compiled from reports for February, from all manufacturing plants except one, for which an estimate has been included in lieu of actual reports.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 161 plants at the close of February, 1936, and of 160 plants at the close of February, 1937.

#### RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	February	Jan.	Dec.	Nov.	1936	1937	1937	1936	1936
The month	.....	16.4	29.6	30.4	40.3	50.9			
The 12 mos. ended	.....	29.2	45.8	44.9	42.7	41.5			

### Production Up

UNIVERSAL ATLAS CEMENT CO., Independence, Kan., plant, has placed into operation an addition kiln. Construction work, including the building of 12 silos, will be completed about May 1.

### Increases Wages

NORTH AMERICAN CEMENT CORP., Albany, N. Y., has put through a new wage schedule increasing the base rate from 48c to 57c per hour. Skilled labor received an increase up to a maximum of 9c per hour. For overtime, employees are to be paid at the rate of time and one-half.

### Reopens Quarries

OLYMPIC PORTLAND CEMENT CO., Seattle, Wash., has reopened its quarries at Limestone after a two month shut-down. The cement plant has been in continuous operation.

# HINTS AND HELPS FOR SUPERINTENDENTS

## Hammerstake

By T. N. HAFFNER,  
Keystone Portland Cement Co., Bath, Penn.

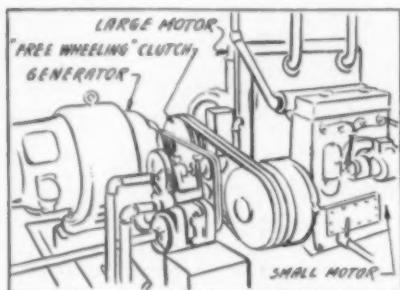
THE EDGE of our quarry is kept trimmed of all loose or overhanging material. The man who does this work wears an approved safety belt, but we have observed that the assistant holds the rope very loosely and usually not snubbed around a rock or tree. The Hammerstake was devised to provide a rope support at any place needed, easy to drive and remove and not too heavy to carry along. The stake is merely placed where wanted and the movable top part worked up and down as a hammer to drive the stake in or out. The point is made of chisel steel hardened and tempered. The parts are, of course, welded together. The implement is thoroughly liked by its users.

## Variable Power Provided

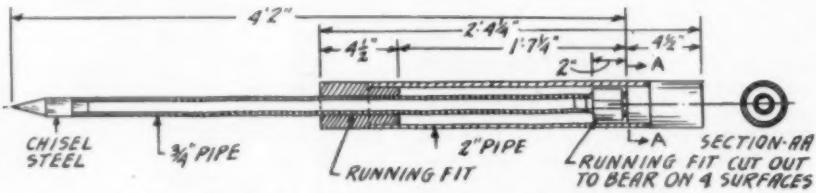
OFTEN plant operators have the power plant problem of meeting economically light, medium or heavy load requirements. For example, there are times when a large power unit consisting of a generator and its motivating power must be substituted for a smaller unit, which was able to meet low plant loads, and vice versa, with many interchanges.

A California producer, manufacturing his own electric power, made a unique installation to meet changing loads. A 35-kw. generator is connected to two gasoline engines, in this case.

The larger engine, 67 hp., is direct-connected to the generator through a "free wheeling" clutch manufactured by Frazier-Wright Co., Ltd., of Los Angeles. The smaller 36-hp. engine is connected to the clutch through V-belts—the clutch arrangement being such that either or both engines can drive the generator.



Generator connected to two engines



Hammerstake to provide rope support wherever it is needed

The small engine is used when the load is light. During peak times, the larger engine is used and both can operate for emergency loads.

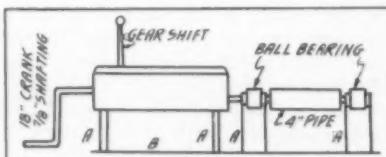
## Hand Winch

By CHAS. CLOWE,  
Oxford, Kan.

THE accompanying sketch shows a hand winch or hoist made from odds and ends. It is very powerful when used with block and falls and can be moved from place to place, as two men can easily carry it.

I bought a gear shift from a wrecked Chevrolet truck for \$5. I made four legs for the gear shift of heavy steel and bolted the legs to the shift and to a frame made of  $\frac{3}{8}$ -in. angle iron, 3 in. in width. Then I cut two circles of  $\frac{3}{8}$ -in. boiler plate, 8 in. in diameter, with a cutting torch.

Centering the circles, I next cut a hole in each the size of two Timken roller bearings that fit the drive shaft of the truck. I next slipped the bearing cases in each hole cut in the circles and



Home-made hoist, portable but sturdy

welded them fast. Then I installed the bearings. After that, I took a piece of 4-in. pipe, 1 ft. long, and welded a circle to each end of the pipe. Then I burned two holes through the pipe at one end, to fasten the hoist cable to. Then I cut two pieces of boiler plate  $\frac{3}{8}$ -in. thick, 6 in. wide, and long enough for legs for the drum.

In placing the Timken bearings in the circles, I left an inch of bearing case to extend through the outer face of each circle. Cutting out holes in the exact center of the legs, I slipped them over the end of the bearing case and

welded them to it. Next I slipped the drive shaft into the drum and connected it on the gear shift with a universal joint. Then I burned holes in the bottoms of each leg and bolted them to an angle-iron frame. Then I made an 18-in. crank for the hoist out of a piece of shaft, and mounted the hoist on the ends of a truck frame. I put on sufficient  $\frac{3}{8}$ -in. cable to raise and lower the suction of a small dredge pump, and found I could throw the gear shift in second and handle the suction in great shape, never getting stuck in cave-ins.

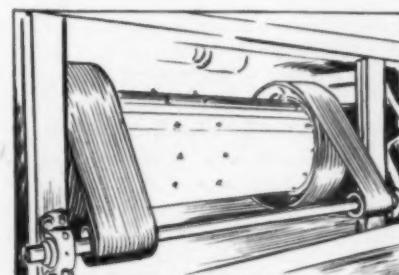
We use this winch for many things. All that is necessary is to get the frame bolted down solid. It is surprising how much one man can hoist by putting the gear in compound low.

## Rod-Mill Drive

A WESTERN MINING COMPANY has recently made a change in the driving mechanism of a rod mill used to crush particles of ore, that might have applications in the rock products field.

The rod mill is a steel shell 3 ft. 6 in. in diameter and 9 ft. long, faced on the inside with steel liners 3 in. thick, loaded nearly half full of steel rods 3 in. in diameter by 9 ft. long.

The ring gear to pinion drive formerly used was replaced by V-belt drives with heavy concrete mounting. Before the mounting was of light structural steel.



V-belt drives on concrete mounting

## Sand and Gravel Dredge Meter

JOHN KRAUSE, superintendent, River-side Sand and Gravel Co., Thiensville, Wis., installed a home-made metering device on the 8-in. discharge pipe of his dredge, to measure the proportions of aggregate to water being pumped. According to his experience, the suction gauge on the dredge sometimes gave misleading readings. For example, he found that the suction gauge reading when mason's sand was pumped indicated a much greater volume of aggregate than actually was the case. Also, the suction reading showed high when the pipe was obstructed by a large rock.

Power requirements for pumping operations are the greatest running expense, and savings here will materially affect the cost of getting out sand and gravel. Undoubtedly, many operators are wishing for an accurate means of determining just when and how much gravel is being pumped. Mr. Krause's method of control is highly practical as well as interesting.

The apparatus used for the meter consists of an 8x6x2-in. tin float, an electric gasoline gauge taken from an old motor car, a "hot-shot," three-cell dry battery and a large milliammeter dial scale located on the dredge boat, near the operator.

The meter operates on the principle

that the discharge pipe sags closer to the surface of the water when solids pass through the pipe, the amount of sag being proportional to the weight of material passing through the pipe.

### All Pontoons Alike

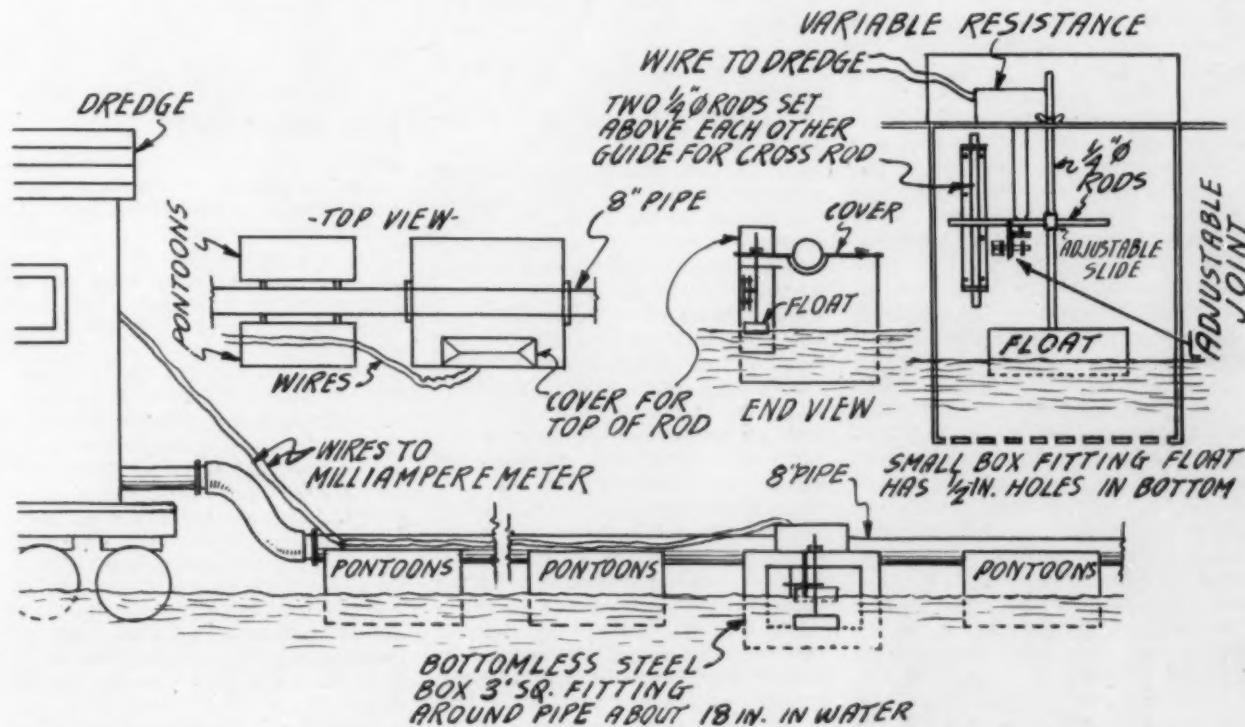
The pontoons used to support the discharge pipe are all alike, and a constant distance of approximately 8 in. between the lower edge of the 8-in. pipe and the water surface is maintained. A 3-ft. square bottomless steel box is suspended by metal straps from the discharge pipe, at a point 90 ft. from the dredge, to extend 18 in. below the water surface. The top of the box extends above the water surface, as indicated, and has a cover. The 8x6x2-in. tin float is placed inside a smaller box with  $\frac{1}{2}$ -in. perforations, located inside the larger box on the side parallel to the pipe-line. The purpose of the larger box is to keep the effect of wave-action from the inner box.

The float has a  $\frac{1}{4}$ -in. rod welded to its center, which extends upward through a 1-in. bracket fastened to the side of the box, so that movement of the float up and down will permit sliding of the rod up and down. A cross rod is fastened perpendicularly to this rod by means of an adjustable slide at approximately the vertical rod's mid-point. Approximately 7 in. from the vertical rod, and parallel to it, two  $\frac{1}{4}$ -in. rods are rigidly fastened to a 1-in. bracket.

with a gap between them to serve as a guide for movements of the cross rod, parallel to the side of the box.

Midway between the two vertical rods, the variable resistance and shank from an old automobile gasoline gauge is mounted, as indicated in the diagram. An adjustable lever from the mid-point of the cross bar engages the gear teeth of the small  $1\frac{1}{4}$ -in. gear, set parallel to the two parallel rods. This gear meshes with a small bevel gear, which in turn measures the movement upward of the float, on the resistance. Electrical wires lead from the resistance to the large milliammeter dial located on the dredge, where readings are observed.

The float is restricted to a 1-in. movement vertically, although the float does not move in excess of  $\frac{1}{2}$  in. Resistances from old radio sets have been used and the dial has been set so that a zero reading on the scale indicates passage of water only, and a reading of 10 indicates that the pipe is full of aggregate. The normal, efficient proportions of aggregate and water give a working reading of approximately 6 on the dial. Readings over 6 indicate an overload of solids, while readings less than 6 indicate that an excess of water is passing. When either of these conditions exists to an appreciable extent, the intake of the suction pipe is relocated to give the desired reading. Mr. Krause says that the use of the meter has increased his capacity 20 to 25%.



Pumping capacity of sand and gravel has been increased 20% to 25% since installation of home-made metering device

# The Readers Write:

## "Bracket Bids"

THE EDITOR: The events of the past few years in American business would seem to be indicative of a new trend. The old attempt at free and open competition created trusts, monopolies, corporate monstrosities, and failures. It also created a sales condition that was controlled solely by one member of the triumvirate—price—while quality and service, the other two members, were forced into the sale by the purchaser.

An attempt to remedy this condition while improving labor was made under the NRA—but we are all familiar with the results. The unfair trade practices, by their very listing, enabled the few rebels to exploit their fellow producers, and labor, more than ever, and make nothing themselves. The posted price method of bidding tended to cause, not a monopoly, but a standard price with secret rebates, gifts, and other unethical concessions to secure business. Thus we see the altruistic objectives actually being used by a small minority to create chaos and disrupt business.

But has this experiment taught us anything? It should point the way to newer methods, more practical methods, and a more stable industrial condition with a healthful labor situation.

The principle of minimum wages and maximum hours should be retained. The 40 hour week in the sand and gravel industry is desirable with a minimum wage of, say, \$15. But how shall we have that condition and insure business at a price that will permit these standards to be retained?

The answer, I believe, lies in a phrase that all industry has inherited from past generations: "The lowest responsible bidder". Therein lies a phrase that has been free of suspicion for quite a long time, but placed under the direct light of true Democracy, it shows many flaws. First, the lowest responsible bidder controls the operations of all bidders; or one concern by its low bid can block the operations of the others; whereas the higher bidders, which are the majority if there are more than two bids, have no control over the low bid. Thus we see why the chiselers under the NRA caused so much trouble and were able to operate under the protection of the law, both before and during this era. Secondly, the lowest responsible bidder, can be a borderline case, that is the profit may be bid out of the job; so to try and make a profit or

break even, if the concern is not too ethical—and numerous concerns are not—labor is exploited or an inferior product is produced. If the above can not be done, it may cause the concern to fail, which creates an unhealthy economic condition. Thirdly, it is not mandatory to award the contract to the lowest responsible bidder, but customary, since not to do so subjects the award committee to such accusations as graft, collusion, favoritism, and various other insinuations.

From the above, it can be seen why the sand and gravel industry has such a high mortality in financial circles; due to a lack of knowledge of the business, and consequent erratic bids by the various individuals that try to enter, who cause a temporary flurry. These temporary disturbances hurt the industry.

## Bracket Bidding

To remedy the faults noted in bidding and introduce a new theory of Democratic control of prices, a system of "Bracket Bidding" should be adopted. By this system, the responsible bidder would be determined by a mathematical formula. There would be no possibility of false accusations against the contracting officers. A better chance of a fair profit, which will insure fair wages and healthy economic conditions will result. Fair competition without monopolistic tendencies, or uniform identical prices, will result.

The Bracket Bid system will take into account all bids placed, thus acting as a true Democracy should, a government by the many. There would be no new boards necessary for this system to function, and the awarding of contracts would be delayed very little, if any, due to its simplicity.

The method consists of taking all bids except the low one, and averaging them, and using that average as a base price. To prevent a high bid being thrown in to raise the base price, the high bid shall not be greater than 20% of the second high bid. In the event a high bid is greater than this 20% it shall be considered an illegal bid, and not included in the bids to determine the average or base price. After the base price has been determined, the low bidder shall be the one that is lowest in the 15% bracket. Any low bid that is lower than 15% below the base price is an illegal bid, and does not count.

An example as to the working of this method is as follows: Suppose four bids

of 98c, 92c, 83c, and 74c per ton were received. Not counting the 74c bid, the average or base price of the other three bids would be 91c. The lowest bid possible with that average would be 15% less than 91c, or 77.35c. Thus the 74c bid is illegal and the award would go to the next low bid, which is the 83c one. A bid that would be too high to consider would be greater by 20% of the second high bid, or in this case would be 20% more than the 92c bid, or \$1.104.

Under the present method, the 74c bid would be awarded and the other three bids would be under the control of this one low bid. This condition causes desperation under times of stress, and creates a continual lowering of bids, in a desperate effort to get business, till an industry as a whole is in bad financial condition. We all know the results of that condition, which are only too frequent.

The "Bracket Bid" system is new—it probably is not perfect—but I have given it lots of study, and, knowing the flaws of the old system, and the results under the NRA, I advocate this system as a long step in the right direction of "Business for Profit". I think it is applicable in other industries as well as the sand and gravel; but if it is adopted in our industry, we will be first to approach free competition without cut-throat prices, and stabilize a great and important industry.

W. C. TORBETT, JR.  
Superintendent, Material Production,  
Texas Railway Equipment Co.,  
Houston, and Austin, Tex.



## L. A. Rattler Test

THE EDITOR: In the December issue Prof. Rothgery of the Engineering Experiment Station, Michigan State College, reports upon the Los Angeles rattler test and concludes that the results are concordant with field conditions as represented by circular test tracks. This test has been proposed and is being considered as a test to fix the acceptability of coarse aggregate for use in several types of highway surfaces. Since others propose that it become a standard test, it is a matter of concern to the aggregate industry and not, as heretofore, a test of local significance.

The Los Angeles rattler test has been in use on the Pacific coast for several years. As a result of numerous observations of existing pavements and tests to relate quality and service, the percentage of loss for the test has been increased from time to time until today, in places where the test is old, there is considerable question about its importance. Even so, no one suggests that it be discontinued.

The discontinuation of tests is seldom attempted. New tests are evolved; but the characteristic conservatism of engineers, especially the older and more experienced engineers, does not allow tests once established to be thrown aside. Good or bad, they remain to plague producers and contractors by reason of the fact that interpretation is next to impossible; and engineers, because of precedents, practices and routine built around the tests are uncompromising and slow to adjust personnel, organization and politics to the new conditions, products and methods.

Thus it is that pioneering or crusading does not pay, and so it is that the aggregates industry must awake to the consequences of proposals for or adoption of tests for materials.

The number of tests which are made to identify a material in order that it may be accepted or rejected under a purchase contract is adequate for most engineering specifications. The number of tests which are made to fix the quality of engineering materials is rather limited. The relation between an ingredient and the quality of the material of which it is a part is but vaguely established by many tests. In this last category we place the Los Angeles rattler test.

In putting this rating on the Los Angeles rattler test the writer is aware of a peculiar conflict between what he says and what he does. He says he doesn't believe in the test, but he does not have confidence in his statement; for he never starts a job without asking about the L. A. Test. This is nothing more than the nature of the engineer in going ahead on a basis of what's behind. Others can avoid this complexity by getting along without the test. In this case what one doesn't know won't hurt. Others who never use the test do just as well in selecting proper materials.

During a recess in the program of the American Association of State Highway Officials, the week of December 7 in San Francisco, a number of testing engineers were discussing this Los Angeles rattler test. One statement concerning the test is significant and probably expresses the opinion of most of those in the group.

"In the class of tests of this kind the Los Angeles rattler appears to be as good as any. Every state should have some such test. It, with others, provides some measure recognized in the contract for acting upon a question about which you need no additional information but only an excuse for making a decision which is binding upon the state and the contractor." In other words the test provides another club in the specifications by means of which the engineer may force recognition of certain conservative and accepted practices.

These tests, though excusable, cannot be justified in all respects. The never-ending conflict between theory and practice will never be concluded when construction engineers can point to good results in certain cases where exceptions are made to the test requirements. Light-weight aggregates make a miserable showing in the Los Angeles rattler test, but many bridges are paved with such materials. If the construction engineer loses confidence in the tests and other laboratory jurisdiction, his usefulness is impaired and his work may suffer in quality. If he attempts to use his "common sense," everyone suffers.

The aggregate industry benefits from testing of materials. Enforcement of specifications is the best way to establish a competitive market. If every engineer could interpret the meaning of the tests, there would be no discrimination. The meaning of the test should be related to the use of the materials whenever possible; and when this is not the case the engineer should be alert to the need for other interpretations of the tests. If this were possible, any kind of a test or no test of any kind would be all right.

Since tests are made to determine the acceptability or suitability of aggregates, and nothing is in evidence to indicate a change in the trend to more tests, the aggregate industry will probably find itself meeting the L. A. rattler test along with many others. But it isn't the test—it's the allowable loss that counts in the market place.

STANLEY M. HANDS,  
California Department of Public Works,  
Division of Highways  
Oakland, Calif.

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### That "Remarkable" Portland Cement

THE EDITOR: Referring to the skeptic you mention in your letter of March 5, regarding the portland cement described in my article in your February issue, Chemists' Corner: In my article I did not mention the origin and brand of the cement in question, to avoid the unnecessary and unethical publicity, and even now I am against it. For your personal information I wish to add that this "remarkable cement" was produced by \_\_\_\_\_. During ten years I was employed by the said organization as a chief chemist.

The chemical composition and the results of tests mentioned on the page 51 of your February issue correspond to a brand which was manufactured under my control in the years 1928 to 1930. This brand was nearly the only cement used for the construction of the new harbor of Haifa and it showed,

really, a remarkable (without quotation marks) resistance to sea water.

With regard to the editor's note I would like to point out that the conclusive words of it: "with the possible exception of sea water," do not correspond to the opinion expressed in my article. On the contrary, I am convinced that a correctly prepared high early strength cement shows a very good resistance to sea water.

The figures mentioned (page 51, column 2) regarding the results of tests of concrete cubes cured in sea water during a period of 5 years support this opinion.

When I mentioned the characteristics desired I stated (p. 50, column 1): "He (the customer) requires also a strong resistance to sea water. Sometimes he may require a resistance against aggressive solutions. . . ."

When I stated that no portland cement can resist the destroying action of aggressive solutions, possibly, I did not sufficiently stress that sea water does not belong to the category of so-called aggressive solutions.

And therefore this little misunderstanding.

I should be pleased if it would be possible for you to bring about a corresponding correction, should the opportunity arise. I did not write about this before, not attaching a great importance to such a correction and expecting to meet some criticism, I would have come back to this point.

DR. GABR. A. ASHKENAZI.  
Brooklyn, N. Y.

### New Marble Firm

OKLAHOMA MARBLE QUARRIES CORP., a new firm, was granted a charter recently for \$500,000 and is to start installation of \$50,000 in machinery shortly. A 99-yr. lease has been acquired on 140 acres of land north of Marble City. Among the by-products will be lime and road building material, and glass and paint-making materials.

### Opens Marble Works

RICHARD GRAHAM is opening a new marble plant at Durant, Okla.

### Concrete Pavement Yardage

AWARDS of concrete pavement for February, 1937, have been announced by the Portland Cement Association as follows:

Type of Construction	Sq. yd. awarded during Feb., 1937	Total sq. yd. for year to date Feb. 27, 1937
Hoads .....	1,455,857	4,291,819
Streets .....	908,153	1,452,332
Alleys .....	7,425	12,072
	2,371,235	5,756,223

## Recent Quotations on Rock Products Securities

Quotations by <sup>10</sup>A. E. White Co., San Francisco, Calif. <sup>11</sup>The Securities Co. of Milwaukee, Inc., Milwaukee, Wis. <sup>12</sup>Wise, Hobbs & Seaver, Inc., Boston. <sup>13</sup>Martin Judge Jr., and Co., San Francisco, Calif. <sup>14</sup>Nesbitt, Thomson & Co., Toronto. <sup>15</sup>First National Bank of Chicago, Chicago, Ill. <sup>16</sup>Hutton, Ladd & Co., New York, N. Y. <sup>17</sup>Rogers and Tracy, Inc., Chicago, Ill. <sup>18</sup>United Press.

## Recent Dividends Announced

Arundel Corp. (quar.)	\$0.25	April 1, 1937
Calaveras Cement, 7% pfd.	2.00	Mar. 31, 1937
(This leaves arrears of \$7.75.)		
Coronet Phosphate (qu.)	1.00	April 1, 1937
Ideal Cement	1.00	Mar. 31, 1937
Kelley Island L. & T.	.30	Mar. 31, 1937
Lehigh P. C. com. (quar.)	37 1/2	May 1, 1937
Medusa P. C. pfd. (quar.)	1.50	April 1, 1937
Minn. Min. & Mfg. (quar.)	.40	April 1, 1937
National Gypsum, 1st pfd. (quar.)	1.75	April 1, 1937
National Gypsum, 2nd pfd. (quar.)	.25	April 1, 1937
Republic P. C., 5% pfd. (quar.)	1.25	June 1, 1937
	1.25	Sept. 1, 1937
	1.25	Dec. 1, 1937
Riverside Cement, A (accum.)	30 1/4	April 15, 1937
(This leaves arrears of \$5.01.)		
Superior P. C.	27 1/2	Mar. 1, 1937
U. S. Gypsum, com. (quar.)	.50	April 1, 1937
U. S. Gypsum, pfd. (quar.)	1.75	April 1, 1937
Yosemite P. C., pfd. (quar.)	.10	April 1, 1937

LONE STAR CEMENT CORP., New York City, reports for quarter ended December 31, 1936, subject to audit and adjustments, a consolidated net profit of \$778,129 after depreciation, interest, amortization, reserves for income taxes and contingencies, etc., equivalent to 81 cents a share on 956,535 no-par shares of capital stock outstanding.

This compares with \$293,715, or 47c a share, on 626,278 shares in December quarter of 1935.

For year ended December 31, 1936, subject to audit and adjustments, net income was \$2,829,464 after above deductions, equal to \$2.96 a share on 956,535 shares of capital stock outstanding, comparing with \$1,048,443, or \$1.67 a share on 626,278 shares in 1935.

No deductions were made for surtax on undistributed profits in 1936 figures.

Consolidated income account for quarter ended December 31 compares:

	1936	1935
Net sales	\$4,980,324	\$3,517,296
*Cost and expenses	4,015,666	3,058,854
Operating profit	\$964,658	\$458,442
Interest, amortization, etc.	15,421	218,533
Reserve for income taxes and contingencies	171,103	153,806
Net profit	\$778,129	\$293,715

For year ended December 31:

	1936	1935
Net sales	\$18,507,672	\$14,085,302
*Cost and expenses	14,467,130	11,648,464
Operating profit	\$4,040,542	\$2,436,838
Interest, amortization, etc.	290,014	1,031,504
Reserve for income taxes and contingencies	921,064	356,891
Net profit	\$2,829,464	\$1,048,443

\*Includes depreciation. †Credit.

UNITED STATES GYPSUM Co., Chicago, Ill., for January, 1937, reports a net profit of \$352,000, compared with \$92,000 in the corresponding month of last year. Sales in January this year were up 72% and in February 76% over 1936.

In stating these figures at the annual meeting, Sewell Avery, chairman, stressed the fact that the better showing this year has been brought about by stocking up of customers in preparation for possible exigencies, and reflects to a considerable extent business which would ordinarily come to the company in March and April.

Sentiment was expressed that, unless unforeseen developments take place, the building trades generally this year expect an increase of roundly 40% over 1936.

The company generally is adhering to a 40-hour week except in certain instances where demand has been high in relation to capacity, in which cases a 48-hour week prevails.

Wage rates generally are 5c to 10c hourly higher than in 1929. In city mills the minimum wage is 52c to 55c an hour, with few employees grouped in the minimum class. Country mills' base rate is about 5% lower than in the city. In the south the minimum wage is 35c an hour to 42 1/2c an hour. Company's wage rate is considerably influenced by the regions in which its plants are located. Those situated in the steel areas follow quite closely the prevailing rate there. The same is true of plants located in the Detroit automobile region. The company's new cement shingle is meeting with excellent success, said Mr. Avery.

So far the labor situation at the company's 50 plants has been quiet. There have been a few minor disturbances but nothing of significant proportions. Wide distribution of company's mills has been helpful in this respect.

Elected as directors were E. L. Ryerson, to take the place of C. F. Henning, deceased; W. B. MacMillan, to take the place of C. W. Highley, deceased, and Clarence A. English to take the place of P. A. English, resigned.

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REPUBLIC PORTLAND CEMENT Co., San Antonio, Tex.: Controlling stock has been purchased by Gus S. Wortham, Houston, Tex., insurance executive. The sale was made by the Century Investment Co. for between \$600,000 and \$700,000, it was stated. A. F. Sayers of San Antonio is president of the company. In addition to being president of the American General Insurance Co. of Houston, Mr. Wortham is former president of the Houston Chamber of Commerce.

BESSEMER LIMESTONE AND CEMENT Co., Youngstown, Ohio, reports earnings for the year ending December 31, 1936, as follows:

Net sales	\$1,485,618
*Net profit	210,008
Earned per share, common	\$0.93
Number of common shares	143,320
*After depreciation, interest, etc.	

As of December 31, 1936, current assets were \$809,327 and current liabilities \$130,269; compared with \$711,769 and \$43,342, respectively, on December 31, 1935.

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LEHIGH PORTLAND CEMENT Co., Allentown, Penn., and its wholly owned subsidiaries, reports for the year ended December 31, 1936, a net profit of \$2,160,670 after depreciation, depletion, federal income taxes, etc., equivalent after annual dividend requirements on 4% preferred stock, to \$2.91 a share on 618,471 shares (par \$25) of common stock, excluding 15,454 shares in treasury. This compares with \$495,961 or \$4.07 a share on 121,738 shares of 7% preferred stock outstanding in 1935.

Current assets as of December 31, 1936, including \$9,508,529 cash and United States Government securities, amounted to \$13,125,621 and current liabilities were \$1,038,412. This compares with cash and United States Government securities of \$8,579,936, current assets of \$12,051,027 and current liabilities of \$535,498 on December 31, 1935. Inventories were \$2,982,733 against \$2,909,323.

Consolidated income account for year 1936, compares as follows:

	1936	1935
*Sales	\$12,770,151	\$9,001,681
Costs, expenditures, etc.	8,849,326	7,072,546
Balance	\$3,929,825	\$1,929,136
Other income	315,219	292,690
Total income	\$4,245,044	\$2,221,826
Depreciation, depletion, etc.	1,729,049	1,725,865
Federal income taxes	355,325	†
Net profit	\$2,160,670	\$495,961
Preferred dividends	333,702	437,940
Common dividends	1,126,635	†
Surplus	\$700,333	\$58,021
*Less discounts, allowances, etc. †No provision has been made for 1935 federal income tax on account of deduction losses through abandonment of capital assets charged to surplus.		

Stockholders, up to December 31, 1936, had converted 30,711 shares of new preferred into new \$25 common stock under terms of company's offer, at the rate of four shares of common for each share of convertible preferred stock. Since the close of the year an additional 16,792 shares of preferred have been converted into 67,168 common shares. As of February 18, 1937, capital stock of company consisted of 73,964 shares of 4% convertible preferred and 701,093 1/2 shares of \$25 par value common stock.

# TRAFFIC and TRANSPORTATION

## Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of March 20:

### New England

41130. Sand and gravel, min. wt. 50 net tons, Kendal Green, Mass., to Fitchburg, Mass.; proposed, 60c per 100 lb. Reason: To enable the B. & M. R. R. to receive a haul on this traffic.

### Trunk

33559 (Sup. 1). To cancel rates on stone chips or granules (roofing granules), C. L., from Baltimore, Deerfield and Flint, Md., and Fairfield, Penn., to C. F. A. destinations published in Agent Curlett's Tariff I. C. C. 520. Reason: These commodities no longer produced at points of origin.

Sup. 2 to 35453. Sand, C. L. (See Note 2), to Brockville, Ont., from L. V. R. stations, Metuchen to Maurer, N. J., 26½c per 100 lb.

Sup. 1 to 35489. Stone, natural (other than bituminous asphalt rock), crushed, C. L., from Jamesville, N. Y., to Ferenbaugh, N. Y., \$1.40, Corning and Big Flats, N. Y., \$1.20.

Sup. 1 to 35581. Limestone, other than ground or pulverized, C. L., (See Note 2), from Billmyer and Union Stone Company, Penn., to Tottenville, N. Y., \$1.75 per gross ton.

35617. Refuse fuller's earth, C. L., (See Note 2) from Philadelphia stations, Penn., to Camden, N. J., \$1.20 per net ton.

35621. Crushed stone, C. L., (See Note 2), from Harrisonburg, Linville and Zirkle, Va., to Washington, D. C., \$1.35 per net ton.

35624. Sand (other than ground or pulverized or naturally bonded molding) and gravel, in open top cars, without tarpaulin C. L., (See Note 2), from Barclay, W. Va., to various points in West Virginia and Pennsylvania, rates ranging from 70c to \$1.30 per net ton.

35641. Limestone, ground or pulverized, C. L., minimum weight 60,000 lb., from Jamesville, N. Y., to River Forks and Leonardsville, N. Y., \$1.45, Sweets and South Edmeston, N. Y., \$1.50 per net ton.

35645. Slate, crushed, dust and ground, when in bags, C. L., minimum weight 50,000 lb. from D. & H. R. R. stations, Whitehall, N. Y., to Castleton, Vt., inclusive, and Poultney, Vt., to West Pawlet, Vt., inclusive, to New York Lighterage, for export, 17c per 100 lb. Reason: Account of comparable rates to Boston.

35658. Slate, crushed, dust or ground, C. L., minimum weight 50,000 lb., from Muncy, Penn., to Chicopee Falls, Mass., 21c per 100 lb.

### Central

49929. To establish on stone dust, carload. (See Note 2), from Piqua, Ohio, to Peoria, Ill., 225c per net ton.

49930. To establish on core sand, carloads. (See Note 3), but not for closed and open top cars of less than 60,000 and 80,000 lb., respectively, from Wilmot, Mich. (Black Siding D. C. & S. Ry.), to Albion, Mich., 125c in open top cars and 160c per net ton in closed cars.

49934. To establish on slag, ground or pulverized, in bulk or in barrels, bags or boxes, carloads, minimum weight 50,000 lb., from Canton, Ohio, to points in Central Freight Association territory; also points east of the Western Terminal of Eastern Trunk Line including arbitrary territory, 60% of sixth class.

49975. To establish on core sand, C. L., from Wilmot, Mich. (Black Siding D. C. & S. Ry.) to Batavia, Buffalo and Lockport, N. Y., 215, 200 and 200c respectively, in open top cars, and 220, 210 and 210c per net ton, respectively, in closed cars.

49980. To establish on limestone, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., from Marble Cliff and Hite, Ohio, to Chicago, Ill., 225c per net ton.

49988. To establish on sand (except industrial), and gravel, in open top cars, C. L., from Mishawaka, Ind., to Michigan City, Ind., 75c per net ton.

49989. To cancel all rates on slag, C. L., (See Note 3), from Bellaire, Ohio, to various destinations, as published in B. & O. R. R. Tariff I. C. C. 22882, representative of which are: Cumberland, Md., Keyser, Terra Alta, Clarksburg, Weston, W. Va., Bruceton, Pittsburgh, Bakerstown, Butler and Foxburg, Penn.; classification basis to apply.

49991. To establish on agricultural limestone, unburnt, ground or pulverized, in box cars, C. L., minimum weight 60,000 lb., from Piqua, Ohio, to New Trenton, Ind., 150c per net ton.

50015. To amend W. T. L. Tariff 41-W. naming rates on (A) Sand, naturally bonded molding, in all kinds of equipment, C. L.; sand (except naturally bonded molding; ground or pulverized sand) in closed equipment, C. L. (B) Sand, ground or pulverized, in all kinds of equipment, C. L. (C) Sand (except naturally bonded molding; ground or pulverized sand) in open top equipment, C. L. from Bay City, Hager, Maiden Rock, Wis., and Red Wing, Minn., to Albion, Lansing and Imlay City, Mich.; (A) 310c, 300c and 310c, respectively; (B) 341c, 330c and Imlay City, Mich., respectively; and (C) 310c, 300c and 310c per net ton, respectively.

50023. To amend Item 7540 of Sup. 55, C. F. A. L. Tariff 130-X (exceptions to Official Classification), naming scale rates on stone, crushed; slag and gravel, coated with oil, on open top equipment, C. L., from various pts. in Ohio to stations in Ohio, applicable on intrastate shipments, only, by adding "Cincinnati, Ohio," as a point of origin.

50027. To establish on crushed stone, C. L., in open top cars, from Lewisburg, Ohio, to Madiera, Ohio, 90c per net ton.

### Southern

13860. Bituminous rock, asphaltic limestone and sandstone; pitch, tar, limestone, road building material and coated stone, C. L. Cancel, as obsolete, rates published in S. F. T. B. Tariffs 286, 206-D, 196-C, 214-A and S. W. L. Tariff 99-C, from Garland, Ky., to destinations in above tariffs. Class or combination to apply.

13935. Sand and gravel, C. L. Establish 750c per car from Chattahoochee River, Fla., to River Junction, Fla., for local deliveries on S. A. L. Ry. or to connection with A. C. L. R. R. for delivery at Florida State Hospital (intrastate).

13968. Crushed stone, C. L., (See Note 3). Establish 50c per net ton from Dugan, Ky., to Falls of Rough, Ky. Truck competitive. Expires June 30, 1937.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

13960. Crushed stone, C. L., (See Note 3). Establish 90% per net ton from Russellville, Ky., to Scottsville, Ky. Truck competitive. Expires June 30, 1937.

13995. Sand, C. L., min. 100,000 lb., (See Note 3). Establish 220c net ton from Talbird, N. C., to Bluefield, W. Va.

13997. Fullers earth fines (refuse), in bags, C. L., min. 50,000 lb. Establish 384c per net ton from Attapulgus, Ga., Jamieison, Midway and Quincy, Fla., to Sheffield, Ala.

13999. Sand, gravel, chert, crushed stone, crushed marble, slag, limestone, etc., between points in S. F. A. territory. Amend S. F. T. B. Tariff 388-A, and 316-A by restricting rates publishing therein to apply only in bulk in open top equipment.

14001. Fluor spar, C. L., as per Items 5558 and 5559, S. F. T. B. Tariff 3-H. Establish from Wilmore, Ky., to points in Ala., Ga. and Tenn., the same rates as in effect from Marion and Harrodsburg, Ky.

### Western

E-151-5. Feldspar, crude or ground, C. L., minimum weight 80,000 lb., from Colorado common points including Canon City, Colo., to E. St. Louis, Ill., and St. Louis, Mo., on traffic destined to points south of the Ohio River. Proposed—\$4.60 net ton.

E-151-6. Feldspar, crude or ground, C. L., min. wt. 80,000 lb., from Echo, Texas Creek, Feldspar, Spikebuck, Buena Vista and Salida, Colo., to Mississippi River Group 1 as defined in D. & R. G. W. R. R. GFD No. 6371-D. Proposed, to apply proportional rates to all Mississippi River Group 1 points on traffic destined to points east of the Ill.-Ind. State Line.

E-151-7. Feldspar, as described in S. W. L. Tariff 14-Q, C. L. minimum weight 50,000 lb. and 80,000 lb., from Salida, Colo., to Texas points. Proposed—To establish rates from Salida 25c higher than rates from Canon City, Colo.

D-55-10. Vermiculite, calcined or roasted, in paper or burlap bags, C. L., from Canon City, Colo., and Pueblo, Colo. Minimum weights: To Group 1 (Mississippi River), Group 2 (Pearl), Group 3 (Chicago), Group 7 (Missouri River); Proposed—24,000. To Denver: Proposed—24,000. Rates — No change.

E-41-197. Proposed to establish rates on asphalt rock, asphalt crushed stone, etc., 10c over the crushed stone basis between stations in Missouri as published in W. T. L. 237 series.

D-41-198. Stone, crushed, C. L., (See Note 3), from Montello, Wis. Proposed, stations Russell, Ill., to Wilson, Ill., \$1.40 per net ton; stations Rondout, Ill., to Forest Glen, Ill., and Belden, Ill., to Libertyville, Ill., \$1.50 per net ton.

D-41-199. Stone, crushed, C. L., (See Note 3), but not less than 50,000 lb., from Morton, Minn., to Fort Dodge, Ia. Proposed—130c per ton of 2000 lb. Expires December 31, 1937.

### Southwestern

10534. to establish on silica sand in box cars, the basis 20 mileage scale of rates of Item 800 per S. W. L. Tariff 162-K, for application on Missouri intrastate traffic.

10660. Silica, crushed or ground, Rogers, Ark., to Gulf ports. To establish export rates on silica from Rogers, Ark., the same as currently applicable on Tripoli from Racine and Seneca, Mo., in Item 5675-B of S. P. F. F. C. Tariff No. 1016-G.

10691. Establish privilege to permit stopping in transit to partly unload shipments of roofing slate and slate slabs, straight or mixed carloads, subject to Section 5 of S. W. L. Tariff 174-I (except that only one stop to be authorized), the application of proposed privilege to be only on "S. W." traffic.

## ROCK PRODUCTS

## Texas-Louisiana

1889-TX. Proposition from shipper to establish a rate of 35c per ton to expire with June 30, 1937, on crushed stone, carloads, from Denison to Sherman. (See Note 3). Purpose of proposal is to establish the same rate on crushed stone from Denison to Sherman as is in effect on sand and gravel. The rate is necessary in order to return to the rails business that is now being trucked.

1897-TX. To establish rate of 40c per ton on sand and gravel, straight or mixed carloads, from Glass, Tex., to Caldwell, Cook's Point, Interurban Junction and Law. Proponent carrier states that due to the fact that contract has been awarded for 12 miles of concrete highway from Law to Caldwell there will be a large movement of sand and gravel. Proposed rate is necessary in order that rail carriers may compete with a trucking company which has already submitted bids for hauling this material.

1901-TX. To establish rate of 35c per ton 2000 lb. on crushed rock in pieces weighing not in excess of 200 lb., from Sudduth to Rutledge. Rate is proposed for application on stone to be used on Marshall Ford Dam and is alleged to be necessary on account of wayside pit competition.

1937-TX. Proposition to amend Item 20, T. & N. O. Tariff 924-D by adding Bertram, Tex., as a point of origin on stone given transit privileges at Austin. At present, transit privilege at Austin published in Item 20 of T. & N. O. Tariff 974-D, applies on stone originating at Burnet, Llano, Marble Falls and Sudduth, Tex. Traffic from these points to Austin must move through Bertram en route to Austin. The transitor at Austin has located a deposit of stone near Bertram which he desires to ship to Austin for crushing and reshipping.

1945-TX. Sand and gravel from Hart Spur to Burleson and Alvarado. To establish rate of 61c to Burleson and 67c per ton to Alvarado, also same reduction in cents per ton from other origins. Rates proposed are necessary in order to meet wayside sand and gravel pit competition.

## Illinois

8363. Molding sand and foundry loam, C. L., (See Note 3), but not less than 40,000 lb., from Richardson and Sycamore, Ill., to Chicago, Ill. Proposed—(a) 75c net ton; (b) \$1.05 net ton.

(a) When for local delivery.

(b) When for delivery to facilities on connecting lines in Chicago switching district.

8380. To cancel present rates on sand and gravel, carloads, from Peoria, Ill., to all destinations on the C. & I. M. Ry. and connections, account obsolete.

## Transcontinental

18968. Add in Tariff 37 on "feldspar" from Custer and Keystone, S. D., to points in Group 1, rates: 67c, minimum weight 50,000 lb.; 57c, minimum weight, 80,000 lb.; 47½c, minimum weight 100,000 lb. (2) Cancel Item 8050, Tariff 1.

3374. Establish on stone, marble or granite (except terrazzo aggregates; bituminous rock, asphaltic limestone, bituminous asphalt rock, phosphate rock, soapstone or gypsum), crushed, granulated, ground or pulverized, including stone dust, in bulk or in bags in box cars, C. L. (See Note 3), from points in S. F. A. to points in official territory, rates based 12½% of first class, except that to points in T. L. A. and N. E. F. A. territories, rates are to be based 12½% of Q plan rates published in Agent W. S. Curlett's Tariff 82-A.

19248. Diatomaceous earth, C. L.: Request for C. L. rate 60c per 100 lb., min. wt. 80,000 lb., from Spokane, Wash., to Group D, Tariff 2.

## I. C. C. Reports

4217. By division 4. Proposed increased and reduced rates on mica and mica schist, in carloads, from points in southern territory to points in official territory found justified. Orders of suspension vacated as of February 13 and proceeding discontinued. The schedules as filed proposed a general revision including both increases and reductions within official territory, within southern territory and between official and southern territories, occasioned by Commission's denial of authority to continue departures from provisions of section 4 existing in rates applicable on these commodities. On protest of certain producers in the south and consumers and marketers in official territory, operation of the proposed schedules was suspended until Feb. 1, 1937, in so far as they named rates from points in southern territory to points in official territory and later was voluntarily postponed until May 2, 1937. In other respects the schedules were not protested or suspended and the rates therein proposed were established July 1, 1936, and are now in effect according to report.

27496. Federal-American Cement Tile Co. vs. Pennsylvania. By division 4. Rate charged, \$1.15 a net ton, between Sept. 7, 1934, and Aug. 25, 1935, common sand, Massillon, Ohio, to Wampum, Penn., unreasonable to the extent it exceeded \$1 a ton, without an emergency charge. In part of the period, in which no shipments were made, a rate of \$1.20, was in effect, as the result of the Industrial Sand Cases, 1930, 204 I. C. C. 159. The \$1.15 rate was restored Aug. 3, 1935.

I. and S. No. 4245, sand, gravel and slag from Alabama to Florida. By division 2. Proposed changes in rates, found not justified. Suspended schedules ordered canceled and proceeding discontinued. Respondents had claimed that the rates which they proposed to change were established in error, not having been based on strict application of the short line rule, as the routes used were those which would produce the lowest rates irrespective of the distance. They took the position that the shortest routes should be used in all instances and had made an extensive rate check and the suspended schedules were the result of their study.

26596. Norcross Brothers vs. Pennsylvania. By division 4. Report of Commission, on further hearing, affirms findings in original report, that rates on sand, from Birmingham and South Pemberton, N. J., to Philadelphia, Penn., and nearby points, were unreasonable and that lower intrastate rates on like traffic from Morrisville, Penn., caused undue disadvantage to complainants and undue preference to their competitors at Morrisville. The Commission said as the unlawful situation found to exist in the prior report had been removed by inter-state and intrastate schedules effective July 1, 1935, and June 30, 1936, respectively, no order was necessary. Complainants were confronted in the Philadelphia area with the competition of truck and waterborne materials from other sources and urged that, in order to meet this situation, the Commission should prescribe rail rates to that area below the maximum level generally approved in this territory, similar to the action taken with respect to the Chicago area in Chicago Gravel Co. vs. A. T. & S. F., 118 I. C. C. 683, and with respect to the Cleveland and Toledo areas in Rates on Crushed Stone, Gravel, Sand and Slag in Ohio, 191 I. C. C. 206. However, said the Commission, such action would not be warranted on the evidence and narrow issues here presented.

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### Proposed I. C. C. Report

27409. Louisville Cement Co. vs. C. & O. et al. By Examiner Worthington. Recommends that the Commission find rate, pebble lime, Milltown, Ind., to South Charles-town, W. Va., unreasonable, past, present and

future to the extent it exceeded, exceeds or may exceed 13c a 100 lb., minimum 50,000 lb. and award reparation. The shipments moved between May 15, 1934, and April 2, 1936. Charges were collected based on the applicable joint commodity rate of 17.5c, minimum 30,000 lb., plus the authorized emergency charge of 1c a 100 lb. on the shipment which moved on and after April 27, 1935.

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## Limestone to New England

A definition of New England territory has been made by the Commission on further hearing in 24757, Limestone Products Corporation of America vs. Lehigh & Hudson River, et al., so as to enable the railroads to apply the ground limestone scales and arbitraries prescribed in American Lime & Stone Co. vs. Pennsylvania, 201 I. C. C. 467. The report said:

"Under all the circumstances we find that, so far as the rates in this proceeding are concerned and so far as the New England carriers and the Delaware & Hudson are affected, New England rate territory is that part of the United States lying east of the line of the New York Central which extends northward from New York City along the east bank of the Hudson River to Troy, N. Y.; of the Delaware & Hudson running north from Troy to Mechanicville, N. Y.; of the east bank of the Hudson River from a point opposite Mechanicville to Fort Edward, N. Y.; and of the Delaware & Hudson running north from Fort Edward through Whitehall, Fort Ticonderoga, Plattsburg, and Canada Junction, N. Y., to Rouses Point, N. Y."

This finding modifies the report on further hearing of June 12, 1935, as modified by the order of Aug. 13, 1934.

Division 2 found in American Lime & Stone Co. vs. Pennsylvania, *supra*, that rates assailed on ground or pulverized limestone from Lime Crest, N. J., to destinations in New England would be unreasonable to the extent they exceeded the scale there prescribed plus arbitraries for hauls in New England, and also subject to the addition of an arbitrary of 70c a ton for hauls involving car float or lighterage service in the New York harbor district.

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## Sand and Gravel Rate Debated

The Mississippi Railroad Commission has approved an order to permit railroads to obtain temporary freight rate reductions on sand and gravel shipments in Mississippi between regular sessions of the Commission. The procedure will permit railroads to meet motor truck competition on movement of sand and gravel used in highway construction. Under this order, the railroad may apply to members of the commission during vacations for a temporary rate reduction. If the commissioners think the reduction is justified, the reduction will be ordered effective immediately but subject to review at the next regular meeting.

The I. C. C., however, has proposed to increase sand and gravel intrastate freight rates in Mississippi to the level of existing inter-state rates.

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## Wants Railroad Allowances

Louisville Cement Co., Louisville, Ky., has filed suit in the Federal court asking an injunction to prevent the Interstate Commerce Commission from enforcing an order banning allowances by the Pennsylvania railroad to the company for car spotting and switching services at the Speed, Ind., mill. The cement company has handled switching of cars at the plant, for which an allowance of 94c a car has been received from the railroad.

# LIME PRODUCERS' FORUM

Conducted by  
Victor J. Azbe,  
Contributing Editor,  
St. Louis, Mo.

## MORE ON BURNING OF SPALLS

**I**N THIS ISSUE we are publishing an excerpt from an article by (as well as part of a letter recently received from) Dr. N. V. S. Knibbs, the leading British lime authority and author of the book, "Lime and Magnesia." The abstract from this letter deals with the advantages of burning small stone and refers particularly to the articles appearing in *ROCK PRODUCTS*, November and December, 1935, LIME FORUM SECTION:

Dear Azbe:—

"It is a long time since I have heard from you, but I always read your articles in *ROCK PRODUCTS* with great interest. I was particularly interested in your articles on burning small stone, as it is a subject to which I have paid much attention in recent years, arising from a series of experiments I did, on the rate of burning of stone. In my opinion the advantages of burning small stone are even greater than you say in your articles, and I think it is the natural and legitimate field for the mixed-feed kiln.

"I have started a series on the Design and Operation of Modern Lime Works in *Cement and Lime Manufacture* . . . In the February issue (now in the press) I deal with the burning of small stone and also summarize, in graphical form, all the information I know about the rate of burning of stone."

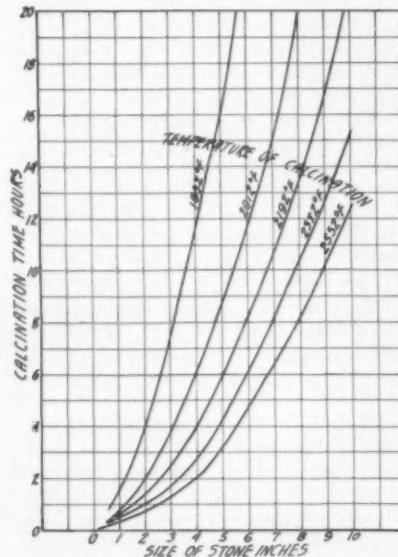
From the *Cement and Lime Manufacture* article above referred to, the chart here given is republished, presenting results of Dr. Knibbs' studies of the rate of calcination at different temperatures. In results, his finding seems to conform closer to practice than either those of Haslam & Smith or C. C. Furnas. Dr. Knibbs continues:

"The article emphasizes the fallacy of the British purchaser's desire for large lump lime. He sights the increasing demand in United States for pebble lime." He further states: "Limestone for burning generally varies widely in size and it is very seldom that it is closely graded. The upper limit of size is often the heaviest piece that a man can load unaided, and the lower limit is frequently fixed by draught considerations in the kiln, the use of too much small stone decreasing the draught unduly. In blast-furnace practise the use of high-pressure blast permits the use of a greater amount of small stone than in a lime kiln; but recent investigations have shown great benefits from grading the burden, and in a lime kiln those advantages must be still more pronounced. Size of stone for lime burning is therefore worthy of much more attention than it receives at present.

### Necessity for Uniformity in Size of Stone

"The most important advantage of stone of uniform size is in the quality of the lime produced. Even when a kiln is heated uniformly over its whole cross-sectional area it will not produce uniformly-burnt lime unless all pieces are of the same size. If the size varies the small pieces will be over-burnt before the large pieces are completely calcined, unless the temperature is very low; in which case the time required by the large pieces becomes excessively long. Close grading of the stone is therefore an important aid to high quality."

This has been emphasized in the FORUM many times. Evidently when one lump of stone, due to its size, requires

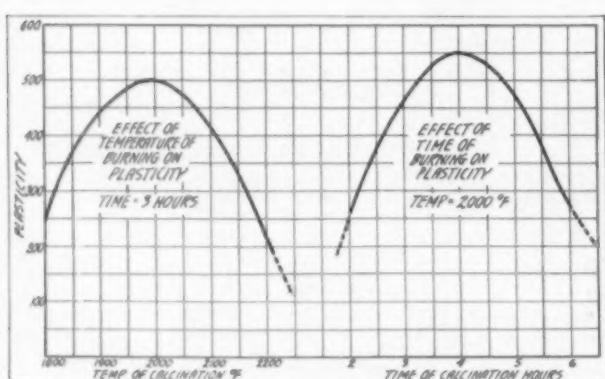


Rate of calcination of limestone of various sizes, as determined by N. V. S. Knibbs

five times the exposure to heat of that of the adjacent lump, the two cannot well be alike in properties when they come out of the kiln. We do not seem to realize fully the rather critical effect of time of exposure upon the properties of lime, particularly on plasticity and time of hydration of dolomitic limes. To aid this understanding, the charted results of Haslam's and Herman's tests on relation of time and temperature to plasticity, are here presented. It will be noted that doubling the required time reduces the plasticity factor by about half, and that the highest point is very narrow, and the least departure from ideal time or temperature drops off the plasticity very greatly. If this is so, then what can one expect when some of the lime is exposed for not twice, but often five times, the required time or possibly even more.

### Draft Conditions

It is assumed in all this, of course, that gases flow past the large lumps more readily than past the small, but that is not always the case and often the large openings become blocked by the small pieces filling the surrounding voids and effectively preventing flow of heat carrying gases. One often sees the sections of rather high temperatures, where the center is dark by comparison, all due to poor gas circulation caused by void-filling spalls. These zones may be several feet in diameter and in effect they equal almost a solid piece of



Relationship of time and temperature of burning to plasticity of Ohio lime, as shown in tests by B. T. Haslam and E. C. Herman

stone of this diameter. It is partly on account of this that frequent drawing is so desirable: to break up these obstructed sections and rearrange the position of the charge.

Dr. Knibbs' conclusion is as follows: "From a full consideration of all the various factors, which would require too much space to be set out here, the conclusion is reached that a gas-fired, shaft kiln is practicable for stone of 2 in. and over, but that below 2 in. the distance the gas spreads is so short that the necessary constriction and complication of the gas inlet zone become excessive. The necessary height of a kiln for 2-in. stone is about one-half of the height of a kiln for 6-in. stone; a greater length than calcination considerations alone would indicate is due to constriction of the gas ports and the combustion space required for the gas. The small stone will be more uniformly and lightly burnt than large stone, probably with a somewhat lower fuel consumption. The power required for exhausting the kiln will be greater than in a kiln of equal capacity using large stone."

Commenting on this, we may say that in general Dr. Knibbs is right, but considering that here in the United States where natural gas is now so generally available, and the central burner is so rapidly being developed, stone down to 1½ in. or possibly even a little less in size can be satisfactorily burned in vertical kilns.

#### Kiln Details

In regard to kiln size, the smaller the stone the smaller need the active kiln size be, even for much higher capacities. However, there is the matter of stone storage. If the kiln is not charged at night, it needs to have considerable of a storage if it is not to be empty by morning. That is the reason for the somewhat queer design of spall kiln shown in December, 1935, *ROCK PRODUCTS LIME FORUM*. If spall kilns were charged reliably day and night, their necessary height would be ridiculously low.

Dr. Knibbs, in his article, further states that when stone is uniform and of 6 in. smallest diameter (it is the smallest diameter that determines size from heat transfer standpoint) and gas is admitted through the walls, that a maximum flame penetration of 4 ft. 6 in. may be expected, so a diameter across the burners of 9 ft. is maintained. With mixed sizes of stone the reach between burners is less. He states that the penetration is proportional to the size of the stone, and so for 2-in. stone it can be only 18 in. and for 1-in. stone only 9 in.

These distances depend of course to a considerable extent upon the entering velocity of the gas and its consequent

#### Operating Men!

THE National Lime Association's annual convention at the Drake Hotel, Chicago, Ill., May 11 and 12, will include a special session on lime manufacturing problems for operating men.

This is the first time in several years a special program has been arranged for operating men. Be sure to ask the boss to take you on his trip to Chicago. It will prove profitable for him as well as for you to be there and take part in the discussions.

power of penetration. With producer gas, as well as with natural gas, the designer of the kiln has considerable control over penetration. With producer gas, to have a few very large gas ports is all wrong. There should be many comparatively small ones. Certain very small producer-gas-fired kilns produce 30 tons of lime, and all of the gas enters through eight ports, each less than 4 in. by 4 in. Under such conditions the velocity and consequent penetration and distribution are much better.

But, if we want to we can readily design a kiln for only 9-in. penetration. It just means the use of both center and side burners; and the kiln design shown in the December, 1935, issue has a penetration of hardly more than this amount. So, all in all, modern vertical kilns will soon be able to encroach into the field heretofore considered exclusively that of the rotary kiln; and one would be tempted to say that the rotary will soon lose the advantages it has in this field. However, rotary kiln development is also progressing and the so common low capacity, low efficiency kiln may even sooner disappear than the obsolete vertical. It is not at all certain that the vertical kiln will win the battle which will be discussed in future *LIME FORUMS*.

#### Lime Producers to Benefit

WASHINGTON-IDAHo LIME PRODUCTS Co., Orofino, Idaho, through its sales manager, I. G. Kjosness, presented a survey to the waterways committee of the Lewiston Chamber of Congress recently, outlining the advantages to producers and consumers of lime rock if the Snake and Columbia river channels should be developed. The wide use of these products and the importance of low transportation rates were emphasized in the report, which was summarized with the prediction that low-cost transportation might double or triple the shipments from the Orofino section in the future.

#### Production Increase

GIBSONBURG LIME PRODUCTS Co., Gibsonburg, Ohio, will resume operations as soon as plant improvements are completed. Four new lime kilns are being installed and new quarry equipment.

#### Wage Increase

BELLEFONTE LIME Co., Salona, Penn., plant announced a 10% wage increase to all employees, effective March 16.

#### Plant Office Burns

STANDARD LIME AND STONE Co., Woodville, Ohio, plant, suffered partial destruction of its office and laboratory by fire caused by an overheated stovepipe. All office records and equipment were saved.

#### Beg Your Pardon

NATIONAL LIME AND STONE Co., Findlay, Ohio, through an ambiguously worded newspaper item, was reported in our March issue, page 73, as having changed ownership to an unknown buyer. What should have been stated is that the company had sold an abandoned quarry property at Bluffton, Ohio, to an unknown purchaser. National Lime and Stone Co. remains under the same ownership as it has for many years.

#### Navigation Season Opens

KELLEY ISLAND LIME AND TRANSPORT Co., Cleveland, Ohio, officially opened its navigation setson, March 5, when its sandboats *Kelley Island* and *Hydro* went to Detroit for their initial trips of the year. It is expected that the boats will operate in continuous service for the year. Improvements are contemplated to the Marblehead dock and repairs are under way at the quarries in anticipation of a busy season.

#### Resumes Production

ASH GROVE LIME AND PORTLAND CEMENT Co., Chanute, Kan., resumed production late in February. The plant was shut down January 15 when all storage bins were full. During the layoff, some of the men were busied making repairs.

#### Interested in Limestone

SEVERAL LARGE CONCERNs are reported to be investigating a rich limestone deposit in Tompkins county, N. Y., presumably being interested in erecting a plant. The 14-ft. ledge of limestone tests 97% calcium carbonate and has a two-foot overburden. Facilities for shipment by water are readily available.

# Splicing Conveyor Belt With Belt Fasteners



**A**T GRAND COULEE DAM, where now runs the largest conveyorized construction project in the world, a remarkable saving in belting replacements has been effected by the conveyor superintendent, John Cunning, for the contractors, Mason, Walsh, Atkinson, Kier Co.

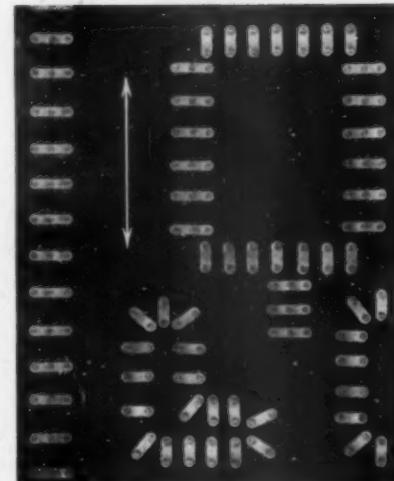
One conveyor is more than a mile in length and contains 22 belts, which run at a high speed of from 600 to 640 ft. per min. The belts are 8-ply, 60 in. in width and are surfaced with rubber 3/16 in. thick. The material handled is glacial moraine — rocks, stones, and damp brown earth, which is dropped on the apron feeders through a grizzly that bars rocks of more than 16 in. in smallest diameter. The material is elevated 325 ft. before it leaves the stacker. Between belts there are drops of from 5 to 9 ft. Breaking the full force of the drops, however, free swinging hooks are suspended in the way of the bounding rocks.

The conveyor has handled over 50,000 cu. yd. of material in a 21-hour shift, and a total of between 12,000,000 and 14,000,000 cu. yd.

Eight belts have been ripped from end to end by snagged rocks. Where this has occurred, or where rocks have beaten holes through the belts or caused rips of various lengths, the belts have been patched and sides of the ripped belt joined together, and service resumed.

The Mason, Walsh, Atkinson, Kier Co. achieved these worthwhile savings (on belting costing in excess of \$10 per ft.) by employing Flexco HD belt fasteners. In fact, at Mr. Cunning's suggestion, the manufacturers have recently produced the Flexco "Rip Plate," illustrated on the following page.

Patches in the belts are cut in rectangular shape, the sides parallel with the sides of the belt, and are held in place with the fasteners. It is advisable to round the four corners of the patch



## READING DOWN, LEFT

(1) Repair of long rip saves replacement of belting. (2) Section of belting 100 ft. long, laced with steel belt lacing. When stacker is to be advanced, sections like this are quickly inserted. (3) Use of "button hook" tool speeds repairs on belt. (4) Hundreds of patches made with fasteners have saved full width sectional replacements

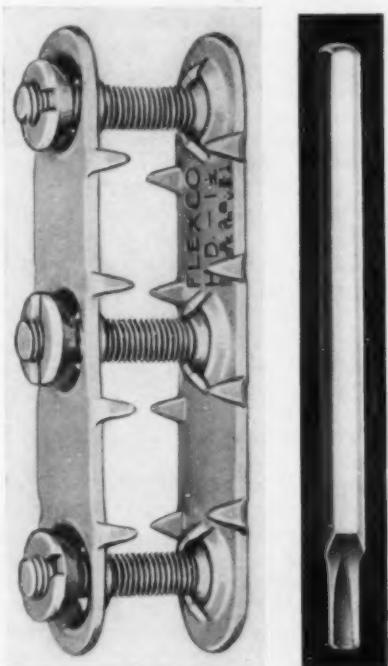
## READING DOWN, RIGHT

(1) Applying fasteners to a rip. (2) Supt. John Cunning, who is in charge of conveyors at Grand Coulee dam. Stackers are seen in the background. (3) Looking at one of the 22 belts in the mile-long conveyor at Grand Coulee dam. Eight have been ripped from end to end and repaired with fasteners. (4) Sample belt, showing use of fasteners in rips and patches

and hole, leaving space for a diagonal fastener on each corner. In attaching the patch, the fasteners are spaced closely on the width of the belt and a space of about 3 in. is left between them on the length.

Patches must always be rectangular or "L" shaped.

The new rip plate was worked out as the result of an attempt by Mr. Cunningham to get a longer grip on the belt in repairing rips. First, he used two sets of the regular fasteners with only three bolts, overlapping one fastener on the other, and joining both sets of plates together in the rip. Then, fastening the outer ends into the belt, he had the full



LEFT—Close-up of a rip plate. RIGHT—Tool which speeds application of fasteners and plates

length of each fastener as an extra protection against the cross strains of the rip. The new rip plate carried this same advantage without the awkward overlapping.

The conveyor at Grand Coulee runs 21 hours daily, and during the rest periods, the operators inspect and repair their belts. Armed with heavy machinist hammers, boxes of fasteners, plates and tools, they test every spot in the belt that looks questionable, and apply necessary repairs.

In addition to the regular tools, the Mason, Walsh, Atkinson, Kier Co. has developed a sort of button hook that speeds application by forcing the top plate over the bolts.

Mr. Cunningham states that use of the fasteners, as here described, has saved

the company thousands of feet of belting replacements, and further states that he has never had to show a man more than once how to apply the fasteners in making repairs.

Another interesting practice on this conveyor is the manner in which the belt is lengthened, so the stacker may be advanced. Sections of belting 100 ft. long are laced in advance with No. 75 Alligator steel belt lacing. There are a number of such sections in the belt, and the new section is inserted by pulling the hinge pin out of joint, putting the section in place and inserting the hinge pins. This job is so systematized that it takes only 28 minutes.

The fasteners, plates and lacing are made by the Flexible Steel Lacing Co., Chicago.

### Another National Gypsum Co. Expansion

NATIONAL GYPSUM CO., Buffalo, N. Y., is taking another step in its general rehabilitation program, this time at the Fort Dodge, Iowa, plant. The improvements scheduled for this plant will represent the expenditure of about \$900,000, including \$500,000 for a wallboard plant which has already been completed, a \$300,000 plaster mill and \$100,000 for new equipment for the block plant and warehouse extension. When completed, 175 to 200 men will be employed.

The wallboard plant is 900 feet long and 140 feet wide, of all-steel construction, and is designed for the manufacture of 75,000,000 sq. ft. of board a year. Capacity of the new plaster mill will be 50,000 tons annually. Modernization of the block plant will double its present output of 36,000 block daily. Frank Jacobson will serve as superintendent of the new wallboard plant.

### Rock Wool Project

FEDERAL ROCK WOOL CO., Kansas City, Mo., has been incorporated for \$50,000 to manufacture rock wool at the site of the Beyer Crushed Rock Co., on Bannister Road. Louis Marino, head of the quarry operations, is listed as a principal stockholder of the new company. Machinery has been ordered and the plant will start operations in May.

### Good Cement Contract

RIVERSIDE CEMENT CO., CALIFORNIA PORTLAND CEMENT CO., SOUTHWESTERN PORTLAND CEMENT CO., and MONOLITH PORTLAND CEMENT CO., all of Los Angeles, Calif., were awarded the contract for 200,000 bbl. cement for Bartlett dam on the Salt river federal reclamation project in Arizona. The joint bid was \$444,692.

### Resume Operations

MONOLITH PORTLAND MIDWEST CO., Laramie, Wyo., began operations for the 1937 season early in March. Most of the employees were retained during the winter shut-down to recondition machinery.

### Stone Sand Plant

RADFORD LIMESTONE CO., INC., East Radford, Va., has leased and will operate a new stone sand plant owned by the Appalachian Electric Power Co. The plant, now under construction on New River just below the electric company's cofferdam, will be completed in April.

### Prices Bid—Contracts

LOS ANGELES, CALIF.: Award was made by United States Engineers of 1580 cu. yd. transit mixed concrete to Consolidated Rock Products Co., Vernon, Calif., at \$12,640 f.o.b. Fort MacArthur, San Pedro.

PORTLAND, ORE.: Award was made by the Oregon State Highway Commission to the Corvallis Sand and Gravel Co., Corvallis, for 17,400 cu. yd. crushed gravel in stock piles, \$25,169.

COLUMBUS, OHIO: American Aggregates Corp. was awarded the contract by Mifflin township for 800 tons of No. 46 crushed gravel with dust at \$1.15 per ton delivered on the township roads.

MUSCATINE, IOWA: The Northern Gravel Co. was awarded the contract for hauling between 12,320 and 15,875 cu. yd. gravel at approximately \$6,762.30. The company was also low bidder at \$3,138.97 for hauling 5000 to 10,000 cu. yd. pea gravel furnished from stockpile or f.o.b. trucks on an optional contract.

FREMONT, OHIO: Gottron Bros. Co. was awarded the contract for supplying the city's needs for stone for 1937 at \$1.25 to \$1.90 a ton delivered. No definite amount of stone was advertised. Marble Cliff Quarries Co., Columbus, Ohio, was awarded the contract for approximately 300 tons of lime at \$8.20 a ton delivered at the filtration plant by truck.

CARDINGTON, OHIO: Ohio Blue Limestone quarry, Marion, was awarded the contract for 200 tons of stone at \$1.15 delivered.

BELLEFONTAINE, OHIO: Contract for supplying the city with crushed stone for street repair was awarded to C. E. Duff, Lakeview. The bid price was 90c a ton at the quarry or \$1.25 delivered.

# PROTECTING DIESEL ENGINES FROM DUST

WITH RAPIDLY INCREASING USE of Diesel engines in the rock products industry, more and more attention is being given to the proper maintenance of these units.

Dust is probably the chief obstacle in keeping engines uninterruptedly in service, especially in this particular field. It is an established fact that even in comparatively clean air there are about four grains of dust per 1000 cu. ft. of air. This is such a small quantity that the naked eye cannot even detect it (7000 grains equivalent to a pound).

By more closely analyzing this dust condition we find, however, that, for example, a 100-hp. engine which takes in approximately 625 cu. ft. of air per min. will suck into the engine 5.14 lb. of dust within 30 days, based on 8 hours' daily operation.

In the rock products industry the concentration may be many times the amount given above; and, in addition, we are dealing with mineral dust, which is of an abrasive nature and very fine, approximately 2 microns (0.00008 in.) in size. It can be clearly seen that it is of utmost importance to protect any engine from this dust.

To separate this dust from the air before it enters the engine, air filters are used. Several different types of

air filters are available. They may be separated into three distinct groups: the coated-screen (impingement) type, the oil bath type, and the dry type, which I am interested in.

The latest development is the dry type filter which, if of proper construction and using a highly efficient filter medium, will provide protection even under severe conditions. A dry type filter employs as filter medium a textile fabric of which an all-wool felt has proved to be best.

Tests conducted by well-known institutions have shown that an all-wool felt of 16-oz. weight per running yard of 72-in. width will remove mineral dust in high concentration with an efficiency of 95.6%, which is entirely satisfactory.

Next in importance to the filter medium itself is the mounting of the filter cloth. It is not a question of cramping into a certain given space the largest number of square feet of filter cloth but rather to mount the filter medium in such a manner that the air passages on the air intake side as well as on the clean air side are open and do not restrict the flow of air. This reduces the pressure drop through the filter to the resistance built up only by the filter medium itself.

A high pressure drop is to be avoided for two reasons: first, it affects adversely the efficiency of an engine; and, secondly, if the support of the filter medium is not exceptionally strong, it

•  
By E. Kundig,  
Coppus Engineering Corporation,  
Worcester, Mass.

results in the gradual collapse of the support and consequently in the destruction of the entire filter.

Numerous spot welds, especially near or in the center of the supporting frame should be avoided, for it has been shown that such welds will not stand up under the continuous vibration created by the pulsating air flow of an engine.

A typically well-designed supporting frame is shown in C (Fig. 1). A wool-felt filter medium made up in the form of a glove E (Fig. 1) is slipped over the frame and when inserted into the filter box A (Fig. 2) which is provided with a retainer grid B (Fig. 2), the glove is tautly stretched so that tapered filter pockets are formed absolutely unrestricted to the flow of air.

This construction furthermore allows the filter medium itself to vibrate; and the dust drawn against the filter cloth is automatically shaken off.

Depending upon the size of the engine, multiples of such filter cells are mounted into a housing (Fig. 3) provided with a suction opening for ready attachment to the engine's air-intake pipe. For outdoor installations, weather louvers are mounted in front of each filter cell to give the filter cloth adequate protection.

Where dust conditions are so severe that the vibration of the filter cloth will not keep the medium sufficiently clean, a small vacuum cleaner with proper cleaning nozzle (Fig. 4) can be

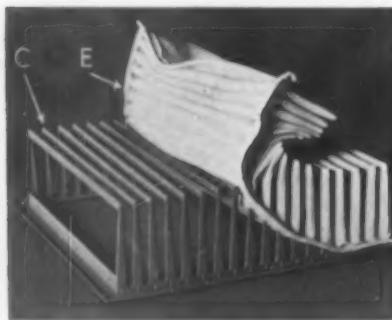


Fig. 1 (left)—Distender frame with air filtering all-wool felt glove partially on

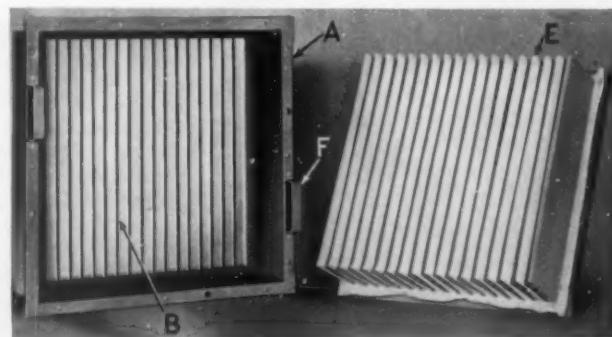


Fig. 2—Filter box with retainer grid into which distender frame is fitted

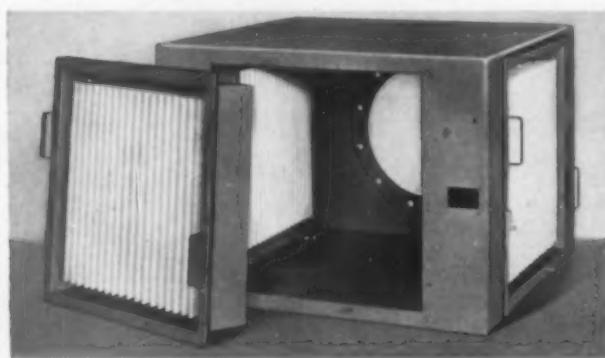


Fig. 3 (left)—Housing for filter cells. Suction opening is for attachment to engine's air intake

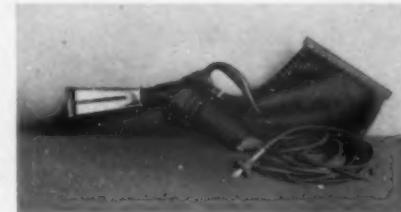


Fig. 4—Vacuum cleaner for use on filter glove when dust is heavy

used to clean the filter glove.

Protection of an engine by means of an efficient air filter will show substantial saving, up to 75%, on lubricating oil, valve grinding, reborning of cylinders, replacement of valves and liners, etc. It will also considerably prolong the life of the entire engine.

### Quarries Purchased

RIFER BROTHERS STONE Co., Ada, Ohio, a new concern, has purchased and will operate the Taylor Stone quarry on Route 69 north of Ada. Repair work on the machinery is to be started soon.

N. R. SCOTT, Georgetown, Ohio, has purchased the John Cushman quarry and crushing plant near Hillsboro, Ohio, and will begin operations as soon as the weather permits.

### Leases Another Quarry

R. NEWTON McDOWELL, INC., Kansas City, Mo., has taken a lease on 70 acres of land on the E. C. Gooden farm, north of Parnell, Mo. The rock in this deposit is available to a thickness of 26 feet. It is planned to quarry rock from this location and from another deposit at Pumpkin Center recently leased, for use on highway work in northwest Missouri. The firm has agreed to remove not less than 10,000 yd. of rock this year at each quarry.

### To Crush Rock Asphalt

AMERICAN ROCK ASPHALT Co., Hillsboro, Ohio, has been formed to mine and crush asphalt rock near Hillsboro, Ohio. The new plant will be opened about May 1. Irwin Stroth will be in charge of operations.

### Contractor Stone Plant

HEMSTRET AND BELL, Marysville, Calif., contractors, are building a rock crushing plant to crush dredger tailings.

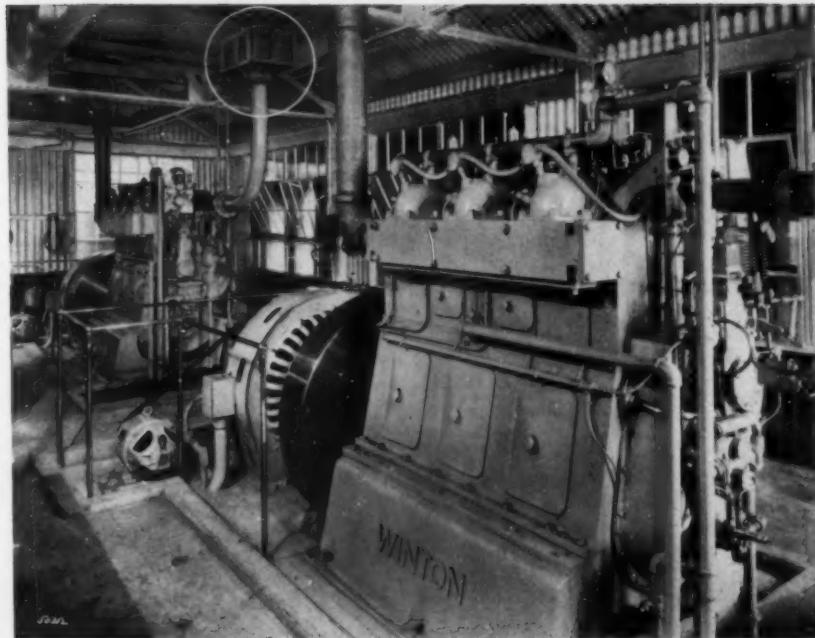


Fig. 5—An indoor filter installation for Diesel engines in a Brooklyn, N.Y., plant

### Lime Convention Set for Chicago

FINAL ARRANGEMENTS have been made for holding the 19th annual convention of the National Lime Association in Chicago, May 11 and 12, 1937. A meeting of the board of directors and executive committee is scheduled for Monday, May 10.

Room reservations have been made for an expected attendance of 100, according to Secretary Brumbaugh. Work has been started on a program that should be both interesting and instructive to executives and plant men.

Arrangements are being made for prominent speakers, details of which will be forwarded to members in the form of special bulletins.

Representatives of non-members as well as member concerns are cordially invited and urged to attend, to take advantage of the opportunity to hear talks pertinent to the industry and to exchange ideas with others. Remember the dates—May 11 and 12.

### Mineral Industries Conference

FIFTH ANNUAL ILLINOIS MINERAL INDUSTRIES CONFERENCE will be held at Urbana, Ill., October 8 and 9, 1937, according to an announcement received from M. M. Leighton, chief of the Illinois State Geological Survey. Dr. Leighton indicated that all future meetings will probably be held in the fall to eliminate many conflicts which have interfered with attendance.

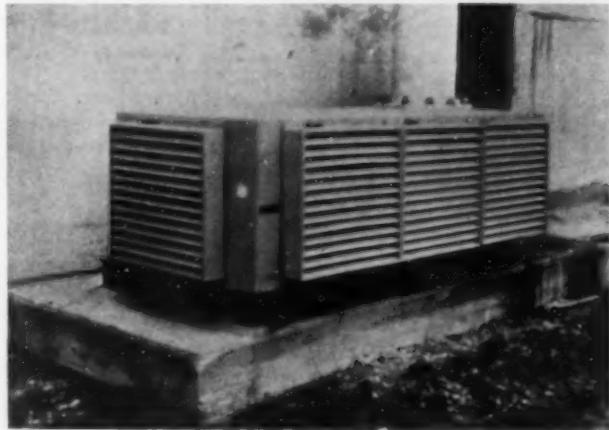


Fig. 6—One of four air filters which serve four Diesel engines in a cement plant in the Southwest

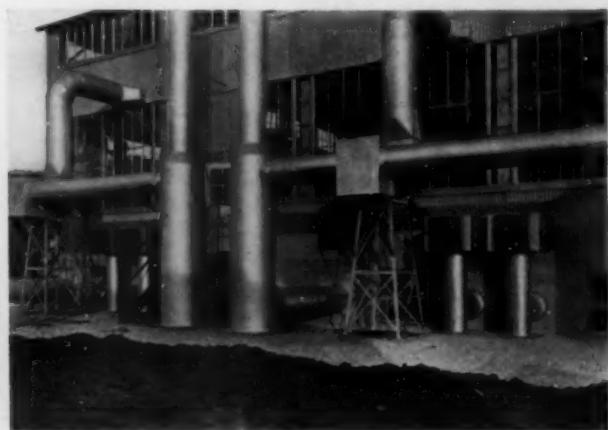


Fig. 7—Four filters installed outdoors at a large Diesel engine installation in the Middle West

## Secretary Ahearn's Visit To Los Angeles

NATIONAL SAND AND GRAVEL ASSOCIATION'S executive secretary, Vincent P. Ahearn, recently completed a trip to the West Coast, where he addressed meetings of producers at San Francisco and Los Angeles. The chief purpose of his trip was to arouse a more active interest in the activities of the National Association, to the building up of which he has given 16 years of his life. A report of the Los Angeles meeting follows:

The subject of Mr. Ahearn's address was "Events of the 74th Session of the Congress and Impressions of the Coming 75th Session." He disclaimed any prophetic powers and warned that his remarks were to be taken as the deductions of a single observer. He prefaced his remarks by stating that of the some 20,000 bills introduced at the 74th session approximately 1,000 became law. Of these, he felt there are four with primary significance to the sand and rock producer. These are the Social Security Act, the Walsh-Healey Act, the Robinson-Patman Act and the Undistributed Surplus Tax Act.

He believes that the Social Security Act is a popular piece of legislation. It unquestionably is having a beneficial effect in a social sense on the American people and has lessened fear of future events. Affecting as it does at least 25,000,000 persons, it is better understood than most legislative enactments. Its stabilizing effect because of direct participation is its best promise of success. Substantially it provides for a tax on employment, an innovation in American policy. Business is constantly striving to reduce costs and the direct effect of this Act will be to reduce employment. Every employer will be forced by competition to use as little labor as is practicable. Even if such now exempted industries as agriculture are not brought under the provisions of this Act, the annual cost by 1952 will reach the stupendous sum of four billion dollars or an amount approximately equal to the present total annual revenues of the Federal government. The unemployment portion of this Act is the only part likely to be held unconstitutional. He does not believe that any modification by amendment is in prospect during the 75th session and also he thinks that labor will be unsuccessful in its attempt to eliminate its direct contribution. He feels that this Act in its general substance is permanent and that a trial period of at least two years will elapse before any material changes may be expected.

In his discussion of the Walsh-Healey Act he told of its easy passage by the Senate without a record vote and of the subsequent extended debate in the House where Representative Healey's name was added to the title of the bill. This bill is an attempt to restore some of the principles of the ill-fated NRA. While this bill was in the hearings stage Secretary Ahearn told of appearing before the committee and being assured that none of its provisions would apply to the sand and rock industry. In its final form the act applies on contracts executed directly with the Federal government, when they amount to \$10,000 or more. Subcontractors were supposedly not in its scope except with regard to its safety and health provisions. It provides that wages are to be established on the basis of those prevailing in the locality where the work is to be done. In direct bids it is mandatory that a work day of 8 hours and a work week of 40 hours be not exceeded.

Since passage of this Act the subject of its scope has become highly controversial, due in the main to the instructions, regulations and interpretations made by the Secretary of Labor. Mr. Ahearn said there was considerable informed opinion that many of these exceeded the power delegated in the Act. In fact some seem to be clearly legislative rather than administrative or executive. In illustrating this point he told of a regulation of the Department of Labor which held that any transaction in which the contracting officers advertised for bids was subject to all of the provisions of the Act.

This Act also contains some very definite provisions relating to the allied subjects of safety and health. Due to this type of legislation, insurance coverage on hazards of this kind will become increasingly necessary and increasingly costly. In view of these developments, Mr. Ahearn said that he could not possibly over-emphasize the necessity for rock and sand producers to insist on complete physical examinations (including an X-ray) of all prospective employees before hiring. This he felt was the only plausible way in which producers could be protected from being victimized by persons suffering from occupational diseases at the time they entered the employment. He believes that this Act would survive a constitutionality test. More rigid interpretation and administration of this Act may be expected in his belief, despite a temporary setback

due to the appropriation request being drastically cut by the House Appropriations Committee.

The Robinson-Patman Act was drawn to regulate unfair trade practices, according to Mr. Ahearn. As adopted it is very indefinite and subject to varying interpretations. When it was under discussion, industry in general was favorable to its passage. It defines unfair practices and provides penalties for infractions against the law. He explained that under the provisions of this Act, the effect of the practice rather than the nature was a measure of its legality. To operate legally, it is necessary that there be no price discrimination, bearing in mind that in making comparisons goods must be of a similar grade and quality. An operator is legally entitled to choose his customers, pass along any real savings in production and selling costs and to meet competition. The Act, however, provides the specific responsibility of the seller to prove that he is meeting a *bona fide* competitive price. The provisions of this Act apply to interstate commerce in general and also under certain conditions to intrastate commerce as well. He believes that the principle of this bill is permanent and that the necessary changes will be made by amendments though probably not at the 75th session of Congress.

In discussing the Undistributed Surplus Tax Act, he said that this tax affected the aggregate producers indirectly as well as directly. The indirect effect will result from the reduction in industrial capital, a substantial portion of which is ordinarily used in the construction of new facilities, thereby furnishing a considerable outlet for the products of the aggregate industry. The Revenue Act of 1936, which contained the provisions for the Undistributed Surplus Tax, initiated a new policy in the Federal government. Through this means, it seeks to control the distribution of funds after ordinary taxes are paid. He believes that considerable sentiment exists in the 75th Congress favorable to the modification of this tax so as to permit a corporation to retain under an exemption from this tax from 25 to 30% of their undistributed surplus.

Speaking on his impressions of legislation to be expected from the 75th session, he did not feel that anything of note will be forthcoming until the President's Judiciary reform proposal has been disposed of. In transmitting this message to Congress, the President attached, in the exact language which he wished used, the bill he was requesting the Congress to pass. Such a procedure is unprecedented in the his-

tory of the United States. Mr. Ahearn in discussing this proposal pointed out that the framers of the Constitution, definitely built up the system of checks and balances between the three branches of government; that the Constitution contains more prohibitions than grants of power. The Constitution does not contain any specific limitations of power to the Supreme Court, and Thomas Jefferson had been most critical of the Supreme Court of his day because it had held legislation unconstitutional which he opposed. In such a form of government as ours it is absolutely essential that we have a final deciding agency such as the Supreme Court, to define powers and jurisdictions, and absolutely free from political domination. Such a condition is endangered by the President's proposal, and Mr. Ahearn hoped for the defeat of the program.

He also discussed some additional legislation being sponsored by Senator Patman under which it would be illegal for a manufacturer to act as his own retailer if it tended to create a monopoly; illegal to consummate tying-in contracts, and to make illegal the basing point or delivered price systems if they tended to create a monopoly. Mr. Ahearn felt that the probability of the passage of legislation of this character is good.

He also discussed the legislation being sponsored by Senator O'Mahoney. This will provide for voluntary Federal incorporation and licensing of corporations. In order to obtain a license, the licensee must accept collective bargaining, a 30-hour week and agree to arbitrate labor difficulties before the Federal Trade Commission. Labor would be prohibited in striking in a licensee's plant for a period of 60 days, but the license of the employer would be subject to cancellation if the Federal Trade Commission decided that he were at fault. Mr. Ahearn did not think that this legislation had much prospect of passing.

Mr. Ahearn concluded his address by quoting some figures from a report by the Brookings Institute. He drew from these figures the deduction that because of the great underproduction of durable goods during the past few years, the prospects of the aggregate industry were without parallel in the history of the United States.

Following his address Mr. Ahearn answered a number of questions and joined in a general discussion with the producers. Many of those present advocated a more general membership in the National Sand and Gravel Association and pledged their support to accomplish this end.

Trinity, Dallas, and L. J. Wheeler, superintendent, Lone Star, Houston, were in charge of the main program features.

Lewis R. Ferguson, vice president, Lone Star, Dallas, was luncheon chairman at which the speakers were C. G. Beckenbach, traffic engineer, City of Dallas, and Dr. Carl A. Nau, director, State Department of Industrial Hygiene.

The regional meeting for the mills of Kansas, Nebraska, and western Missouri, was held at Hotel Booth, Independence, Kan., March 19. C. M. Carman, superintendent, Universal Atlas, Independence, acted as general chairman and P. R. Chamberlain, superintendent, Dewey, Dewey, Okla., as afternoon chairman. O. W. Wilson, chief of police, Wichita, spoke at the luncheon on "Highway Safety." A. B. Sunderland, presiding. Among those who took prominent part in the day's program were C. P. Mitchell, superintendent, Monarch, Humboldt. R. P. Scott, assistant superintendent, Universal Atlas, Independence; C. C. Reid, chief clerk, Ash Grove, Chanute, and J. G. Statler, chief clerk, Lehigh, Iola, and Clarence Lamoreaux, Consolidated, Fredonia.

Further meetings of the series will be held as follows:

DAVENPORT—March 31.  
Hotel Blackhawk.

Chairman: G. S. Parker, superintendent, Dewey, Davenport.

INDIANAPOLIS—April 6.

Indianapolis Athletic Club.

Chairman: C. Erdman, superintendent, Lone Star, Greencastle.

COLUMBUS—April 8.

Deshler-Waileck Hotel.

Chairman: L. P. Glennan, chief electrician, Diamond, Middle Branch.

DETROIT—April 20.

Hotel Statler.

Chairman: G. W. John, vice-president and general manager, Petoskey, Petoskey.

PITTSBURGH—April 22.

Hotel William Penn.

Chairman: R. L. Slocum, superintendent, Universal Atlas, Universal.

ALLENTOWN—May 21.

Hotel Americus.

Chairman: Frederick B. Hunt, electrical engineer, Nazareth at Nazareth.

ALBANY—May 24.

Ten Eyck Hotel.

Chairman: J. B. Zook, chief engineer, Great Lakes, Buffalo.

BALTIMORE—May 26.

Southern Hotel.

Chairman: Daniel Baker, Jr., vice-president, Standard Lime & Stone, Martinsburg.

SEATTLE—Date, hotel, and other details not yet arranged.

LOS ANGELES—Date, hotel, and other details not yet arranged.

## Correction

COLUMBIA QUARRY CO., St. Louis, Mo., denies that it is contemplating purchase of a quarry at Prairie du Rocher, Ill., as noted on page 73 of ROCK PRODUCTS' March issue. The company merely examined the possibilities of the property, as it has of many quarry properties offered to it.

## SAFETY MEETINGS UNDER WAY

### Regional Conferences by Cement Association Stir Enthusiastic Interest

FOR THE ELEVENTH consecutive year the Portland Cement Association is holding a series of regional safety meetings in sections of the country in which member mills are located, providing opportunity for cement operating organizations to analyze past safety performance and to plan for the future. A total attendance of about 1650 cement mill and quarry employees is expected for the fourteen meetings of the series, and a large number of the leading operating men of the industry are already scheduled to participate in the program.

The first meeting of the 1937 series was held at the Tutwiler hotel, Birmingham, Ala., on March 4, with an attendance of over 100 representatives of mills located in the southeastern states. I. C. Brotzman, superintendent of the Lone Star Cement Corp., Birmingham, acted as general chairman, and G. W. Rhodes, chief chemist of the Pennsylvania - Dixie Cement Corp., Clinchfield, Ga., as chairman of the afternoon session. Important program numbers were led by A. D. Stancliffe, general superintendent of the Lone Star,

New Orleans, La.; R. H. MacFetridge, superintendent, Lehigh, Birmingham; D. M. Goss, safety director, Universal Atlas, Leeds, Ala., and G. D. Youell, general foreman, Alpha, Birmingham.

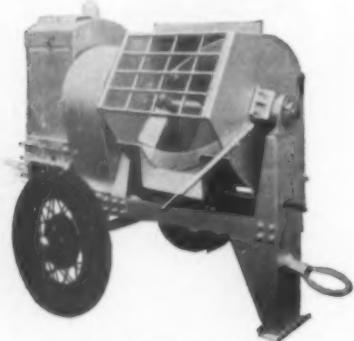
Frank E. Spain, president, Alabama Motorists Association, was guest speaker at the luncheon, at which Col. H. A. Reninger, Lehigh, past-president, National Safety Council, was toastmaster. Other prominent cement leaders present included P. C. VanZandt, vice-president, and Leonard Wesson, operating manager, Universal Atlas, Th. Avnsoe and J. W. Johnston, vice-presidents, Lone Star, and A. J. R. Curtis of the Portland Cement Association.

A similar meeting of the series was held at Hotel Baker, Dallas, Tex., March 16, participated in by nearly 100 representatives of the Texas and Oklahoma mills. N. M. DeBruin, assistant superintendent, Lone Star, Dallas, acted as chairman, and Claude McMillan, safety director, Oklahoma, Ada, Okla., presided at the afternoon meeting. C. A. Wallerstedt, superintendent, Universal Atlas, Waco, G. W. Ganser, superintendent,

# NEW MACHINERY AND EQUIPMENT

## Truck Mixers and Agitators

RANSOME CONCRETE MACHINERY Co., Dunellen, N. J., announces new and interesting features in its line of truck mixers and agitators. Some of the advantages claimed are simplicity of design, sturdiness of construction, lightweight but strong materials, ease of operation and accessibility of parts.



Mortar mixer

Truck mixers are available in capacities of 1, 1½, 2, 3, 4 and 5 cu. yd. and agitators can be had in 1½, 2, 3, 4½, 6 and 7½ cu. yd. capacities. Each model is complete with an independent power unit and the engine is equipped with a self starter. Units are streamlined to minimize wind resistance and the center of gravity is claimed to be such as to provide proper distribution of the load on the truck.

The drum shell, mixing blades, charging door and discharge door



Truck mixer

are of high tensile manganese steel, with mixing blades designed to eliminate clogging. The top charging door is accessible from the side runway, water valves are of the hand wheel type to prevent opening from vibration and two water reservoirs are provided. Other details of construction have to do with eliminating side sway and close control of the water content and the drum rotation. A plaster and mortar mixer are made in 6-cu. ft. and 10-cu. ft. sizes specifically for the plasterer.



Inexpensive box car loader

## Box Car Loader

LINK-BELT Co., Chicago, Ill., has developed a new type of box car loader designed for handling bulk materials without generating a lot of dust or degradation in the loading operation. An anti-friction belt conveyor, constituting the loading element of the machine, is supported on a horizontal boom so arranged that it can be racked back and forth, or rotated 360 deg. by hand. The conveyor is operated at a comparatively slow speed and has a discharge height of 5 ft. Being mounted on four swiveling castors, three men, it is said, can move the machine into and out of cars. When in place, one man is required to operate it.

## Light-Weight Excavator

BUCYRUS-ERIE Co., South Milwaukee, Wis., announces the new 19-B, a ½-yd. excavator which is said to offer easy mobility, compact design, a high-speed cycle and convenient convertibility features. The 19-B weighs 16 tons and offers a travel speed of 1¾ m.p.h., a swing speed of 4¾ r.p.m. and a hoist line speed of 184 f.p.m. The machine is available for gasoline, electric or Diesel power.

A special trailer has been designed for removal of the excavator from job to job at fast trucking speed. The narrow overall width and short tail swing

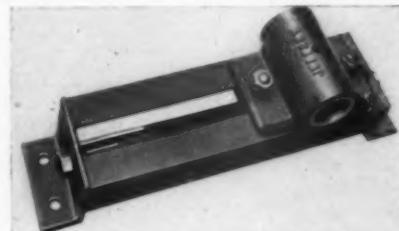


Light, convertible excavator

are claimed to enable normal operation in tight quarters, in traffic in narrow alleys or close to a wall or bank. Seven types of front-end may be had, to convert the machine quickly to the type of operation best suited to the job. By the addition of front-end equipment, it can be changed from shovel to dragline, clamshell, lifting crane, dragshovel, skimmer or backfiller.

## New Screw Takeup

JEFFREY MANUFACTURING Co., Columbus, Ohio, is introducing a new screw takeup for conveyors and elevators, which is guarded from dust and dirt by an inverted shield. The adjusting screw is protected from damage at all times as well as from operating strains and shocks.



Protected screw takeup

## Vibrating Screen

ALLIS-CHALMERS MANUFACTURING Co., Milwaukee, Wis., has placed on the market a positive electro-magnetic vibrating screen in which standard alternating current may be used with-



Electro-magnetic vibrating screen

out expensive auxiliary equipment. This new screen, the "Utah," is said to be particularly adapted for screen cloths having openings of ½-in. or less and for either dry or wet screening. They are available for 25, 50 or 60 cycles at 440 volts, the high frequencies being

recommended for fine screening. Screens may be had in open or closed types, the open type being available in effective screen area sizes of 4x6 ft. and 4x7 ft.

### Weigh Feeder Machine

**S**YNTRON CO., Pittsburgh, Penn., has developed a "Gravimetric" feeder machine which is designed to feed bulk material in a steady, continuous stream at a desired constant weight per minute or hour. The feeder flows material from the supply hopper on to a short, constant speed, synchronous motor-driven belt conveyor.

The belt conveyor is suspended from a scale equipped with sensitive electric controls, which electrically speed up or slow down the rate of flow of material to the belt as the scale beam moves. Accuracies in feed as high as 100% are claimed for some materials, by its manufacturer. The machines are built to order, the size and design depending upon the material to be handled and the range of feed desired.

### New High-Speed Shovel

**N**ORTHWEST ENGINEERING CO., Chicago, Ill., announces a new  $\frac{3}{4}$ -yd. shovel, the model 25, which is readily convertible from shovel to crane to dragline by changing booms. Speed is the outstanding characteristic claimed for the shovel, which is similar in design to Models 15 and 18, but larger and heavier throughout. A Wisconsin 6-cylinder gasoline engine is the regular power unit, but electric or Diesel power are also available.

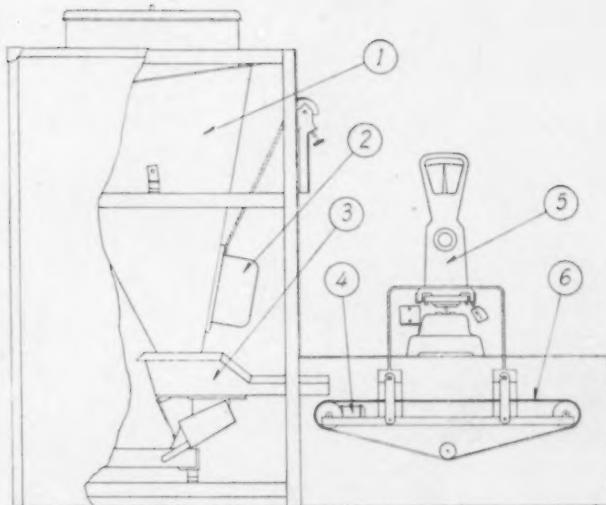


High-speed  $\frac{3}{4}$ -yd. shovel

### Line of Tractor Equipment

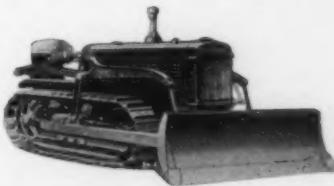
**B**UCYRUS-ERIE CO., South Milwaukee, Wis., has placed on the market its Bullgrader and Bulldozer, the two first units in a new tractor equipment line.

*Feeders for handling dusty materials are totally enclosed. They may be operated in batteries discharging into a mixing machine to produce a blend of materials in accurate proportions*



It is claimed that machines already in service are setting high performance standards on widely varied jobs such as in grading for highways, working in mines and quarries and on large dam projects.

The Bullgrader is a double-purpose unit which can be used both for grad-



Bullgrader or bulldozer

ing and bulldozing. The blade may be angled quickly to the right or left for continuous side-casting, it may be set straight across for bulldozing and

may be tilted for filling, terracing or establishing a grade. It is claimed that these units are quickly and easily mounted on a tractor without drilling, cutting or defacing the tractor frame. The twin hydraulic cylinders which power the blade action of both units operate at low oil pressure, and the operator's control commands a blade travel speed of 32 inches in three seconds.

### Heavy Service Tire

**T**HE B. F. GOODRICH CO., Akron, Ohio, has announced a line of large "earth mover" truck tires, designed for heavy service in fields where motorized equipment is used to move large quantities of soil and rock. The tires will carry a maximum of nearly eight tons per casing, and are available in 12, 16 and 20 plies in two types of tread.



Four heavy duty tires on one axle will carry 30 tons

## Boost in Wages

MARQUETTE CEMENT MANUFACTURING Co., Chicago, Ill., has raised the wages of employees at the Cape Girardeau, Mo., plant an average of 10 per cent.

## New Chief Engineer

ALLENTEW, PORTLAND CEMENT CO., Catasauqua, Penn., announces the appointment of Major F. H. Compton as chief engineer. Mr. Compton, who was formerly associated with the Louisville Cement Co. in a similar capacity, will also serve as chief engineer for the Valley Forge Cement Co.

## Installing Dust Collectors

CALIFORNIA PORTLAND CEMENT CO., Colton, Calif., and ASH GROVE PORTLAND CEMENT CO., Chanute, Kan., are reported to be installing Norblo dust collectors.

## Promote Cement Plant Superintendent

LEHIGH PORTLAND CEMENT CO., Allentown, Penn., recently promoted John Young, superintendent of the Oglesby, Ill., mill, to an executive position in the company's New York office. Mr. Young has been connected with the Oglesby plant since 1915, before its sale to the Lehigh Portland Cement Co.

## Penn-Dixie Plant Resumes

PENNSYLVANIA - DIXIE CEMENT CORP., Kingsport, Tenn., plant resumed production March 1 after a three month shut-down. Work was also resumed at the company's quarry at Marcem, Va. The Kingsport plant was awarded the Portland Cement Association safety trophy for the second consecutive year for completing a full calendar year without a single disabling accident to an employee.

## Second Kiln Operating

LONE STAR CEMENT CO., Bonner Springs, Kan., increased its production in March by starting a second kiln. The plant has been operating one kiln steadily during the past year.

## Cement Plant Blast

NORTH AMERICAN CEMENT CORP., Howes Cave, N. Y., plant suffered damages estimated at \$1000 to its power house and injuries to an employee from an explosion. The blast was believed to have been caused by sparks from a faulty motor igniting dust generated from pulverizing coal. The plant had just been reopened for the season's run, following the installation of clinker coolers and air separators.



H. P. Reid

## Universal Atlas Appoints H. P. Reid

UNIVERSAL ATLAS CEMENT CO., Chicago, Ill., has appointed H. P. Reid as operating engineer. Mr. Reid formerly was special engineer and has been with the company 14 years. His entire experience has been connected with plant work and has dealt particularly with kiln operations and fuel economy. He is a graduate in mechanical engineering of Cornell University and is a member of the American Society of Mechanical Engineers and of the American Society of Heating and Ventilating Engineers. He is author of "Studies of Fuel Economies in Burning Portland Cement," "Use of Fuel in the Manufacture of Portland Cement" and "Use Classification of Coal in the Portland Cement Industry."

## Monarch Elects Directors

MONARCH CEMENT CO., Humboldt, Kan., at its recent annual meeting elected 10 directors as follows: Paul Brown, Wichita; A. L. Cook, Ottawa; John G. Coursen, Simpson, Kansas; Wm. A. Fair, Hutchinson, Kansas; P. J. Meehan, Lincoln, Neb.; Walter Roll, Wichita; Frank Wachter, Kansas City, Mo.; C. A. Brooke, Fred H. Rhodes, Walter H. Wulf, Humboldt. The election of one of the eleven directors was deferred to a later date.

## Improves Cement Plant

VALLEY FORGE CEMENT CO., West Catasauqua, Penn., is repairing and improving its plant to increase production, in anticipation of the largest volume of business in years. The capacity of the separation plant will be doubled.

## Promotions

PENNSYLVANIA - DIXIE CEMENT CORP., New York, N. Y., announces the appointment of Guy D. Pitts as district sales manager for the Northwestern territory in charge of the Des Moines office. Mr. Pitts was assistant treasurer of the Clinchfield Portland Cement Co., of Kingsport, Tenn., from 1912 to 1926, when that company was merged with others to form the Pennsylvania-Dixie Cement Corp. Mr. Pitts joined the corporation when the Des Moines office was opened, as assistant secretary-treasurer. E. J. Head, assistant district sales manager for the Southern section will now operate from Washington, D. C., instead of Richmond, Va.

## Installs Coal Pulverizers

LEHIGH PORTLAND CEMENT CO., Metcaline, Wash., plant has installed two direct-fired coal pulverizers. The Mason City, Iowa, plant has resumed production after a three-months shutdown.

## Cement Operations Resumed

FEDERAL PORTLAND CEMENT CO., Buffalo, N. Y., resumed operations after the winter shutdown two weeks early this year because of the increased demands for cement for construction. About 100 workers were called back, and one kiln was placed into operation, representing 50% of the plant capacity.

## Plant Expansions and Wage Increases

MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, recently granted a second wage increase in the past six months to employees of the Bay Bridge, Ohio, plant and each employee was presented with a \$1000 life insurance policy. This plant has operated over a thousand days without a lost time accident. The company, in addition to expenditures in excess of \$200,000 in 1936 on its plants, has appropriated \$225,000 for expansion at the Dixon, Ill., Silica, Ohio, and Wampum, Penn., plants. According to the annual report of the company, 1936 business was the best since 1928.

## Correction

Not 60 ft. but 125 ft. is the length of the kilns removed from Michigan's state cement plant which is "gone with the wind." (See *ROCK PRODUCTS*, January, 1937, p. 117.) Obsolete for the manufacture of cement, the kilns "junked" when the plant was demolished are reported to have found use in other industries. Two were purchased and resold by the Consolidated Products Co., machinery and equipment, New York City.

# Concrete Products

## Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Section of Rock Products

### *Modernism in Concrete*

THE ADVANTAGES which may be incorporated in a 100% firesafe home of concrete masonry construction are effectively demonstrated in a model home of modest size recently completed for Robert S. Everitt, Kansas City architect.

Being an architect, Mr. Everitt fully recognized the advantages of firesafeness, permanence, low maintenance cost and reduced plaster shrinkages. First floor construction consists of a 6-in. concrete slab laid over 8-in. of rolled cinders, with 8-in. Haydite masonry blocks in the walls. A feature of the

second floor is the 2½-in. concrete slab superimposed on 8-in. precast joists. By exposing these joists, a beamed cell-

ing effect was provided, affording a homey touch and a decorative advantage to the second floor recreation room.



Construction and completed views of concrete masonry home built for Kansas City architect.



A typical \$3,650 to \$4,000 bungalow of popular type which Strandberg and builder R. M. Jackson plan to feature in large development this year.



Another attractive home for which this firm furnished concrete masonry and precast floor joists. Phillip T. Drotts, architect.



John L. Strandberg with C. E. Swanson in Concrete Building Units Co. (formerly Kansas City Dunfile Co.), Kansas City, Mo.

# Hats off to you . . . . .

JOHN STRANDBERG

If you were at the Chicago convention, you heard John Strandberg's fine talk on selling concrete houses. Since then, he has put his ideas to work. Early in March, he wrote us:

*"Thought that you would be interested in having a report on the progress being made with concrete houses in this area. So far this year we have orders for 13 houses in which concrete masonry walls and precast concrete joist floors are being used. In addition we have many prospects lined up and it seems almost certain that before the end of the year we will make a fine showing in the total number of houses erected."*

YOU can do as well. Especially if you build a concrete demonstration home. Or,

better still, if you get a prominent builder or realtor in your locality to feature concrete construction. Are you going to be satisfied with a foundation block business when you can sell complete masonry walls and partitions, ashlar veneer, precast floor joists and other concrete products? You can easily double your residential volume.

Write us for mats of small newspaper ads No. RO 1 to 13 to use in advertising concrete home construction over your name or the names of your builder friends.

**PORTLAND CEMENT ASSOCIATION**  
DEPT. 4-45, 33 W. GRAND AVE. CHICAGO, ILL.

# Concrete Products

MAKES FULL PRODUCTS LINE

## Concrete Joist and Filler Block Floor System

Bedford Hills Concrete Products Corporation Also Produces Aggregates, Block, Pipe and Ready-Mix

THE PRECAST CONCRETE JOIST has become so popular in the East that architects are recommending its use for residential floors in all types of homes. The number of plants manufacturing this product increased from none a few years ago to 11 in 1935 and to 35 in 1936.

One of these concerns, the Bedford Hills Concrete Products Corp., Bedford Hills, N. Y., has gone a step farther by developing both a joist and floor filler block system, which is being sold very extensively. Since its development, in 1934, more than 150 houses have been built with this type of floor construction, at least on the lower floor.

Designated the "Floroform System," many advantages are claimed over other types of fireproof floor systems, especially because of its simplicity and ease of erection. No forms are required.

The type of construction can be best described by the accompanying cross-sections, illustrating the method of placing the floor filler block with respect to the joists. It is said that the system is readily adaptable to almost any architect's conditions.

The joists are manufactured with 6-in., 8-in., and 10-in. depths, generally for spans of 16 ft. or less. The maximum span recommended is 20 ft. About 90% of the floors placed so far have

been placed with 8-in. joists. Joists are designed according to load-bearing requirements and are adequately reinforced with tensile and compressive steel.

### Manufacturing Process

Joists are cast in a mold placed on a vibrating table, and are vibrated approximately 600 times per minute. The pulsations are created by an out-of-balance flywheel. The reinforcing is held in place by rigid fastening to the forms. An average of six joists are manufactured in an hour using just one mold.

In order to have a clean surface so



Block plant and storage yard of Bedford Hills Concrete Products Corp., Bedford Hills, N. Y.



LEFT—Scale and bin floor for ready-mix concrete. RIGHT—Sand and gravel are trucked from the pit to the screening plant



that the grout placed between the joist web and floor filler block will have a good bond, no oiling of forms is required. The company has been issued a patent on the manufacture of joists in paper-lined molds. Joists are manufactured with gravel and other aggregates.

The floor filler block are manufactured from lightweight aggregates, for ease in handling and to take advantage of the sound proofing and high insulating values associated with such aggregates. The block are generally 3 in. thick or less, and each size unit is

slightly longer in one dimension than the other, so that they can be turned to meet varying spacing of joists. The units are generally about 3 sq. ft. in size and weigh 50 lb.

#### Erection Process

In placing, a mortar consisting of 1 part cement to not more than 3 parts of sand should be poured in the joints between the blocks and in the joints between the blocks and the joists, and brought approximately level with the top of the blocks. After grouting, a concrete not leaner than 1 part of cement to 2 parts sand to 3½ parts of ½-in. gravel is poured to a level about 1 in. above the top of the joists. Such floors can be covered with wood flooring, linoleum, linotile, rubber tile, cork and other composition floorings as well as flagstone, brick and tile.

No forms are required, and it is claimed that costs compare favorably even with wood construction with lath and plaster under. Such a floor not only is fireproof but is assembled on the job without any cutting or fitting. From a decorative standpoint, a true beam effect is presented below the filler units. These beams can either be covered with a coat of cement paint or a thin plaster coat.

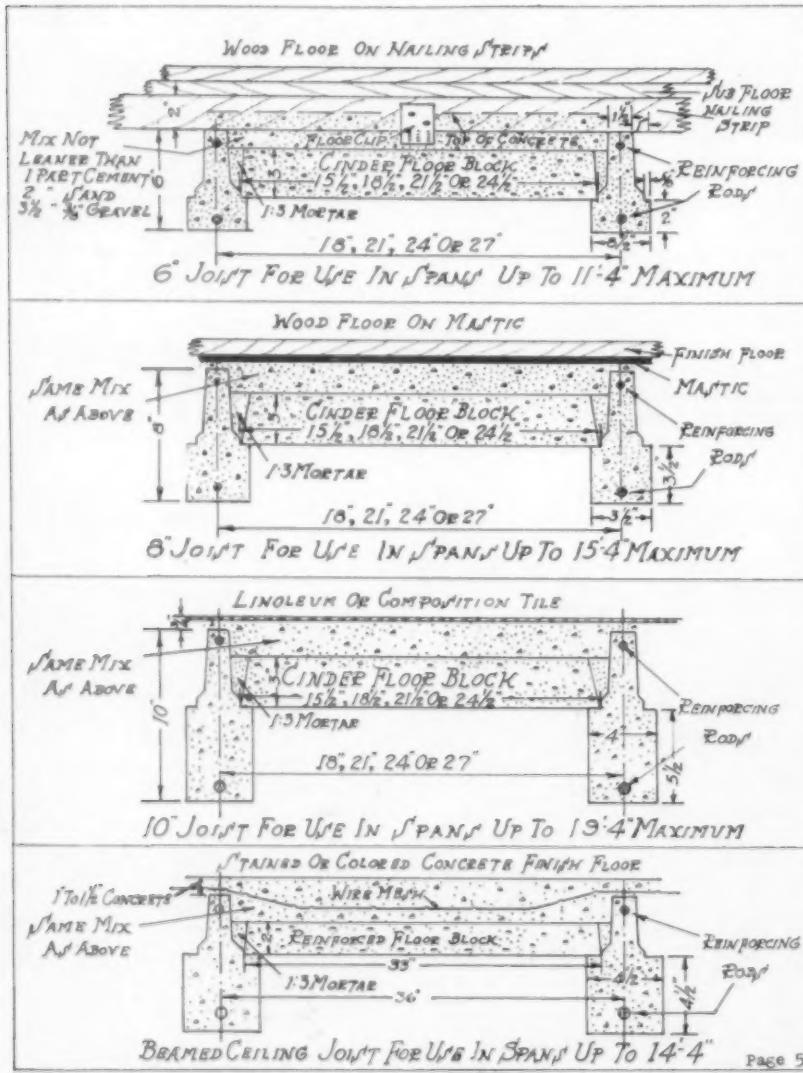
#### Merchandising

Two engineer-salesmen are employed to contact the architects. When the architect has convinced the owner that he should build with "Floroform Floors," a contract is drawn up, and a setting drawing is provided for the contractor. Each unit is numbered to facilitate his erecting the floor. The floor system is in display in the company's show room on New Street, Bedford Hills.

The company holds patents on the design and manufacturing processes and is now making plans for expanding the use of "Floroform Floors" to other parts of the country.

#### Aggregates

In addition to the floor featured, the company handles a complete line of other products, and produces its own



Details of fireproof floor construction by the "Floroform System"



Two views showing "Florotorm" floor under actual construction. Note the gaps between joists and filler block to provide for cement grouting

sand and gravel for ordinary uses, some of which is sold commercially. One of the two pit deposits is adjacent to the plant. Deposits in this locality have a comparatively low percentage of gravel and some boulders. A Federal and a Dodge end-dump trucks are loaded by a portable bucket loader, and the sand and gravel is hauled up a grade to the screening plant.

The trucks discharge over a 3-in. bar grizzley. The throughs are lifted by a 30-ft. centers bucket elevator to the rotary sizing screen. The oversize is

thrown to one side and passes through a jaw crusher. The jaw crusher product joins the throughs at the foot of the bucket elevator. Sand, grits, pea gravel, gravel and oversize are separated and discharge to each of the five bins below. A roll crusher is provided at the discharge end of the screen for crushing cinders, when they are being used for some jobs.

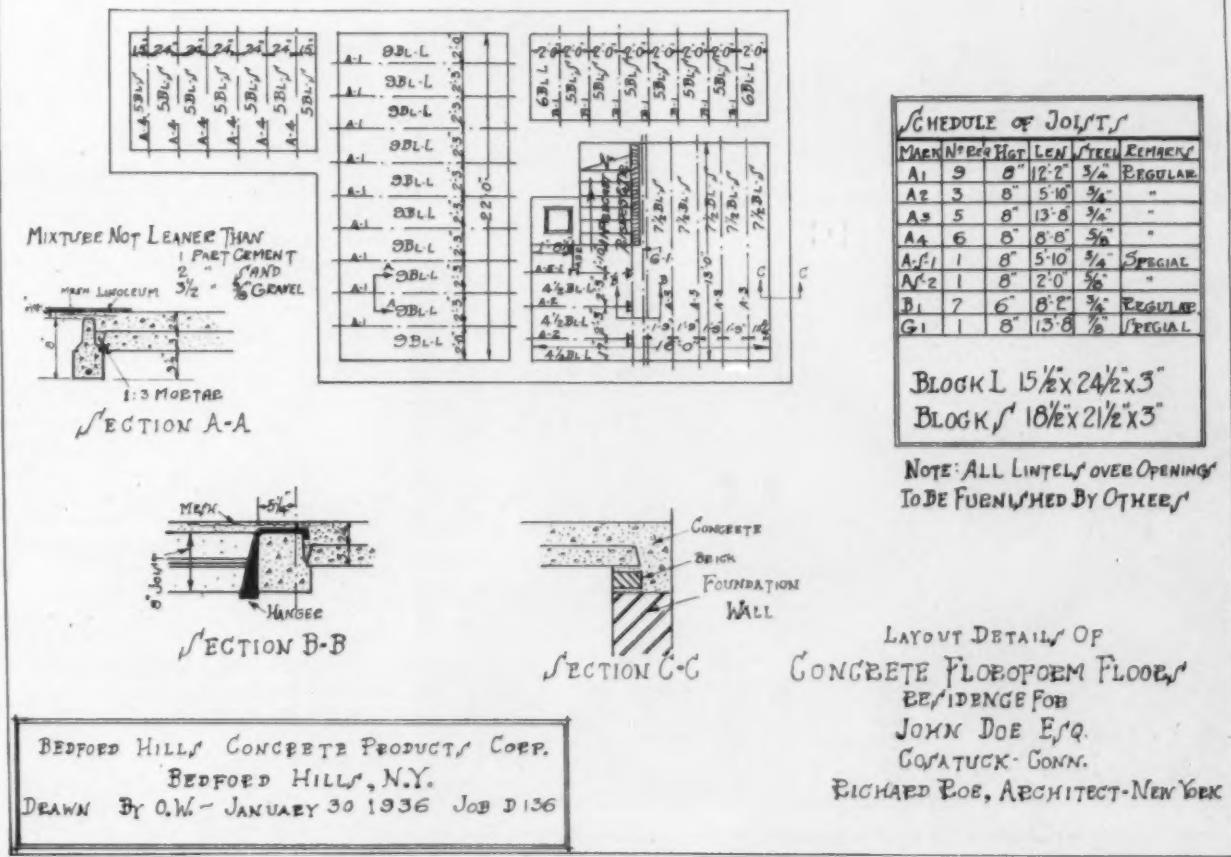
Two plants are used for the manufacture of concrete products: one now operating on two shifts for block and joists, the other plant for miscellaneous

products. Aggregates are hauled to these plants by truck.

#### Tinted Block

Among the interesting products developed is a sand and gravel unit, tinted with mineral colors, used for above ground construction, inside and outside. Well-rounded, light-colored grit-size gravel and sand taken from Long Island Sound are used as aggregates in these units. Any tint desired is obtained by mixing mineral colors with the cement, before charging the mixer. The

TYPICAL JOIST LAYOUT AS FURNISHED BY THE MANUFACTURER FOR EACH JOB





LEFT—All-concrete office of Bedford Hills Concrete Products Corp. The exterior is of textured block. RIGHT—Close-up of gravel block where fines have been removed to accentuate well-rounded particles

finer particles of sand and cement on the exterior surface of the unit are removed by air and water pressure applied

by a "gun," to accentuate the grit particles and give a pleasing surface texture. Limestone and brownstone fronts are

readily reproduced by the proper use of the coloring minerals.

#### Standard Block

Approximately 1200 to 1300 standard concrete block are manufactured, daily, on an Anchor tamping machine. A 14-cu. ft. Ideal mixer is used. Another interesting unit is one designed to give a shingle effect, when used for exterior construction. This unit is manufactured on the regular machine using a mold with one end lengthened about  $\frac{5}{8}$  in. on the bottom.

#### Special Products

Flue block, in 8x8-in. and 8x12-in. sizes, are manufactured, as well as septic tanks ranging from 165 to 2200 gal. in capacities. The 4-in. drain tile used for septic tanks are manufactured as well as precast pipe from 8-in. to 30-in. in diameter, by a hand process. Concrete lintels, concrete brick, concrete sills, and standard I-beam type precast joists are other products.

Shipments of products are made only after very thorough curing. Units are allowed to cure for 28 days or more before removed from the storage yard. In very warm weather, units are water-sprayed, and in cold temperatures, steam curing is applied for 24 or 48 hours. The general line of products is hauled 20 or 25 miles as a rule, but the company's trucks have delivered products as far as 80 miles. Two Federal trucks, with flat dump bodies, are used for general delivery purpose.

#### Ready-Mix Concrete

Two years ago equipment was installed for the production of ready-mix concrete to serve local territory. The Beaumont bin is divided into three compartments, holding a total of 66 cu. yd. of fine gravel, coarse gravel and sand. Trucks haul these aggregates direct from the screening plant bins up an



A load of concrete block ready for delivery in one of the company's new trucks. The office is in the background



"Floroform" floor being placed on a large structure



incline and dump to these bins. The aggregates are proportioned in a 1 1/6-yd. batcher and weighed by a Fairbanks-Morse dial scale. Ready-mix is made and hauled in a 1 1/2-yd., and a 2 1/2-yd. Rex truck mixers.

Officers are B. A. Cushman, president; C. Everett Burbank, vice-president and manager; and Doris L. Burbank, secretary.

### Modernizing

THE ROGAN CONCRETE PRODUCTS CO., Goshen, Ind., is modernizing its plant. A Miles tamper machine and other equipment has been installed. Products to be manufactured are concrete building block, slabs and manhole block.

### To Add Conveyor

V. PATERZO BRO. & SON, Baltimore, Md., has recently installed a new Bessemer automatic concrete block machine and will install shortly conveyor for handling material to the mixer.

### Buys More Trucks

ARUNDEL-BROOKS CONCRETE CORP., Baltimore, Md., recently increased its delivery fleet with eight new Rex Moto-Mix trucks.

### Still Going Strong

UNION SPRING AND MANUFACTURING CO., New Kensington, Penn., pioneer of the pressed steel pallet, announces that it has passed the 20-year mark in the furnishing of various types of pallets.

### New Corporation

MUNNSVILLE LIMESTONE CO., INC., Oneida, N. Y., Edmund Clarke, president, has been formed and will lease the quarry of the EASTERN ROCK PRODUCTS CO. Operations are to begin early in April.

### An Unusual Fire

VICTOR MICA CO., Spruce Pine, N. C., suffered \$25,000 damages by fire to two of the four units addition to the plant, in March. It is believed that the fire started when heated mica caused the rubber belting of a bucket elevator to burn. Regular business of the company was not interrupted by the fire. The unit will be rebuilt immediately.

### To Make Silica Brick

CAMBRIA CLAY PRODUCTS CO., Oak Hill, Ohio, is building a new silica brick plant at Blackfork, Ohio. The brick will be power pressed and made from Sharon conglomerate quartz testing 99% silica. The Allied Engineering Co. is building the dryers.



Interior of Cape Cod house. Note true beam effect from using patented floor system

### Contract

MISSION CONCRETE PIPE CO., San Antonio, Texas, was recently awarded the contract for pipe for the Alamo Heights sewer system extension.

### Rebuilds Plant

SHEARMAN CONCRETE PIPE CO., Oklahoma City, Okla., plant, has been rebuilt following its destruction by fire early in March with estimated damages of from \$5000 to \$10,000. Employees of the company aided in the rebuilding.

### Publicity

THE SULLIVAN CO., Memphis, Tenn., issued in March the first issue of a new house organ showing "Famous Pictures." Views of buildings all over the world where the company's products, Konset, Sealit, X-It, and Kant-Leak, were used are in the 4-page leaflet.

### Curing Room Fire

D. H. MERRITT AND SONS BUILDING MATERIALS CO., Lincoln Nebr., suffered practically the complete loss of its building by fire recently. The fire is believed to have started from a furnace left burning to cure concrete blocks.

### Appoints Specialist

THE NEFF AND FRY CO., Camden, Ohio, builder of storage and handling plants of all types, announces that H. D. Herbster has joined its organization. Mr. Herbster, through his past connection as general manager and treasurer of the Godfrey Conveyor Co., Elkhart, Ind., and his affiliations in the construction industry, has had 20 years' experience with the problems involved in handling and storing of bulk materials.

### Concrete Brick

CLARE J. PARKER, Springfield, Vt., will start operating a new Dunbrik plant in the near future.

### Settlement for Injuries

LYNN SAND AND STONE CO., Swampscott, Mass., was ordered by the Superior court to pay damages of \$2150 to an employee injured by falling rock, at the company's quarry, in November, 1933. Injuries consisting of a broken jaw, cuts on his head and fractured ribs incapacitated the employee from work for a year.

### Proposed Rate Change

35620. Blocks or tile (nonornamental) (not reinforced with metal), made of cinder and cement, sand and cement, slag and cement, cinder, sand and cement, or slag, sand and cement. C. L., minimum weight 60,000 lb., from Scranton and Green Ridge, Penn., to Retreat, Penn., \$1.20 per net ton.



Cape Cod concrete house recently completed at Bedford Hills, N. Y., painted with white portland cement paint. Even the shingles are of concrete

# CONCRETE PRODUCTS CURED ELECTRICALLY

Rapid Turnover of Stock, Reduced  
Shrinkage Are Advantages

THE PRACTICE of electric heating of concrete is based on the fact that freshly deposited concrete is a conductor of low voltage electric current. The method of curing is based on the discovery of A. Brund and H. Bohlin, engineers of Harnosand, Sweden, that fresh wet concrete can be heated as a resisting medium by relatively small electric potential, and that this heating speeds up the process of hardening in its early stages. Only alternating current can be used, since direct current will electrolyze water. The most favorable potential differences are between 20 and 110 volts.

In Soviet Russia the method has been closely studied and put into practice. Andrei Rethy, engineer, Moscow, has been the leader in this work and has recently published (1935) a book on the subject "Electro-Concrete Applied," which is now in the hands of a translator and will be available in English at an early date.

The *Journal of the American Concrete Institute*, May-June, 1934, page 7, refers to "Concrete Electrically Heated for the Moscow Subway." Here cube tests showed that if the heating is maintained for 24 hr. immediately after placing, the three day strength of the concrete is 95% of that of the 28-day strength of the untreated cubes. On

this project a puzzolan portland cement (30% puzzolan and 70% cement clinker) was used.

The Technical Development Corp., Union Guardian Building, Detroit, Mich., has purchased the American rights to this process under United States Patent No. 1,808,762 issued June 9, 1931.

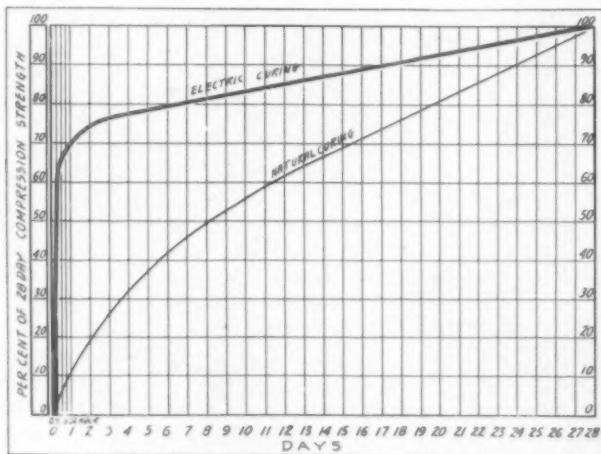
## Early Block Strengths

The economy of this method of curing concrete for the concrete products

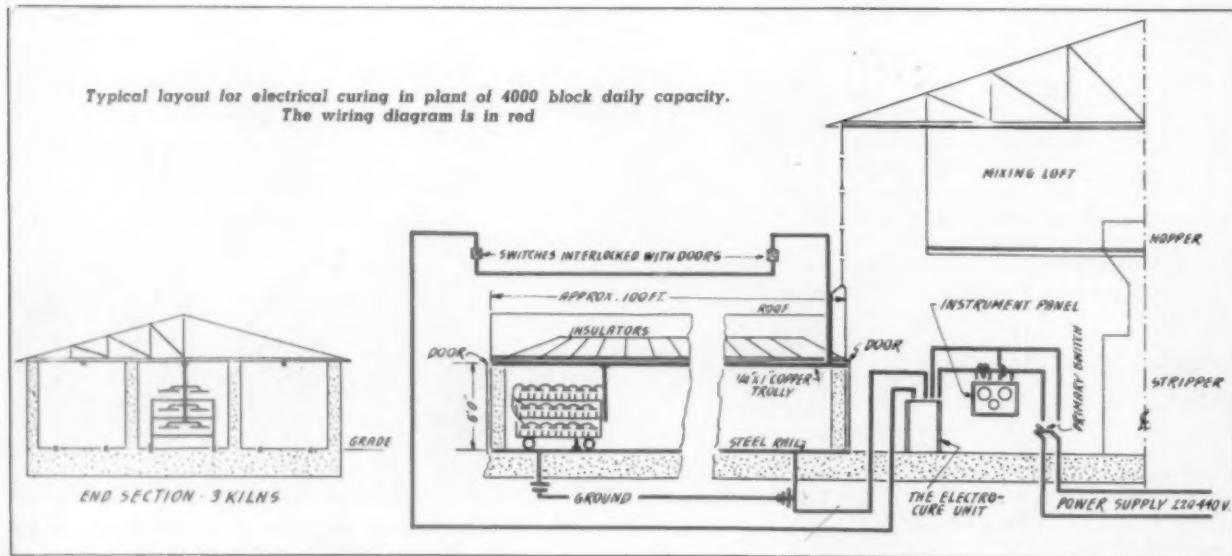
industry has been recently established by the experimental work conducted by the Technical Development Corp. and the Detroit Edison Co. under the supervision of Howard Stevenson, engineer of that company, at the plant of the Standard Building Products Corp., Detroit. It is said that concrete block electrically cured for six hours showed strengths equal to 50% of the 28-day strength or equal to 23 hours high pressure steam curing.

The blocks were cured on standard metal racks, the only additional equipment being a metal plate laid on top of the blocks and used as an electrode. Saturating the curing chambers with water produced higher and more uniform strength. The current cost per block figured between three- and four-tenths cents, based on a kilowatt-hour rate of two cents. Shrinkage was relatively low. The freshly moulded concrete temperature at the start varied from 40 deg. F. to 66 deg. F. During a

Graph showing acceleration of hardening and increase in compressive strength due to electric heating in curing concrete products



Typical layout for electrical curing in plant of 4000 block daily capacity.  
The wiring diagram is in red



series of test runs, raising the temperature 35 deg. F. to 45 deg. F. permitted the safe handling of the blocks at the end of six hours, and shipment to the job in 24 hours.

Standardized "Electro-Cure" apparatus is now available in units ranging in capacity from 500 to 1500 (8x8x16-in. or equivalent) block every six hours. The Chase Foundry and Manufacturing Co., Columbus, Ohio, has developed a standard line of "Electro-Cure" racks as well as parts needed to convert certain types of present rack equipment to the "Electro-Cure" process.

#### Also for Mass Concrete

The process has also been made available for mass concrete work through the use of electrode plates made from ordinary cheap sheet iron, the plates being brought into direct contact with the concrete and connected by conductors to the source of electric current.

Theoretically, 0.28 kw.h. has been found necessary to raise the temperature of concrete each degree Fahrenheit, but the figure 0.4 kw.h. per cu. yd. per degree is used for preliminary estimates of power requirements for curing concrete, due to imperfections in installation. The power relationship is shown by the following equation:

$$P = \frac{Vt}{T}, \text{ where}$$

$P$  = power in kw.

$V$  = volume of concrete in cu. yd.

$t$  = temperature in degrees F.

$T$  = time in hours.

#### New Block Plant

CHERRYDALE CEMENT BLOCK CO., Cherydale, Va., J. E. Toone, president, is building a new plant to have a capacity of 3000 block a day.

#### Waterproof Cast Stone

MONARCH BUILDERS SUPPLY CO., Rossford, Ohio, has perfected a new waterproof cast stone block which is claimed to be the strongest waterproof unit of masonry construction in the low-priced field and is said to be an innovation in the building field.

# GRAVEL AND PIPE

## New Culvert Plant on Indian Reservation at Fargo, N. D.

By H. M. FITCH

North Dakota State College, Fargo, N. D.

THE CONCRETE SECTIONAL CULVERT CO., of Fargo, N. D., has recently leased property in the Devils Lake Indian Reservation in the north central part of North Dakota from the United States government and has developed a new gravel pit on the land. In connection with the gravel operation a concrete pipe plant has also been constructed. At first it would seem as if the development of a pit several miles from any city or town and in rather sparsely settled area, would be inadvisable, but it must be remembered that this state does not possess large gravel deposits, and a location with as large a potential supply is well worth developing.

The Concrete Sectional Culvert Co. has been operating two modern concrete pipe plants for several years. The larger of the two is at Fargo, where also the main offices of the company are located. The other one is at Grand Forks, a city of about 15,000 people. Neither of these plants has any gravel supply available, so the company was anxious to open its third plant where there was an abundant supply to be found. The Devils Lake plant is located about 80 miles due west of Grand Forks, so that the company can utilize this source of aggregate for its plant at that city also.

Work was started on the project in the spring of 1936 and progressed so rapidly that both the gravel plant and the pipe plant were in operation during that summer. The pit was opened by removing the overburden with two Caterpillar tractors equipped with "Tumble-Bugs." The stripping, in general, runs from two to three feet in thickness. The "cats" used were a 35 and a 60.

After the stripping for the first section of the pit was finished, the smaller Caterpillar was retained for moving the gravel to the pit hopper and grizzly.

#### Gravel Plant

The pit hopper delivers the material to a belt conveyor which takes it to a Universal crusher. The discharge of the crusher goes to a second belt conveyor of Link-Belt construction which carries the material to the top of the plant. Here it is delivered to a four-deck vibrating screen, furnished by Coyle and Roth, Minneapolis, Minn., which is used both for washing and sizing.

The plant is of timber construction throughout except for one overhead metal bin of 21-yd. capacity, which is used for sand. The graded gravel is at present being chuted to stock piles beside the plant for storage. Later it is contemplated that overhead bins will be constructed below the screen to facilitate handling of the aggregate. The stock-piled material is reclaimed by a Barber-Greene loader.

Water for washing cannot be obtained from any surface supply, so the company has dug a well on the property and installed a Sterling centrifugal pump to deliver the water to a 20,000-gal. overhead tank. All wash water at the plant comes from the tank through a metal pipe supported on a wooden trestle. This system provides a constant head at the plant without requiring that the pumps be operated continuously, thus permitting the pumping to be done as efficiently and economically as possible. Plans are being considered for creating a storage reservoir to permit a



Pipe plant and storage yard of the Concrete Sectional Culvert Co., near Devils Lake, N. D. The company has a similar plant at Fargo



Gravel washing and screening plant for culvert manufacture. The pipe line at right supplies wash water from an overhead tank

greater volume of storage if it is found that the pump draws down the well too much under continued operation.

The company places the least estimates on the amount of gravel available on lands which are now under lease as one million yards, and it is probable that there is actually considerably more than this. The bed on the leased property is fairly uniform in thickness, averaging about 15 ft. in depth. Samples of the material were sent to the Civil Engineering Department of the North Dakota State College and tested in the materials laboratory. For the unwashed sand, tests showed about 3½% of silt, which is easily reduced to a negligible percentage by the washing done at the plant. The tested samples easily passed the A. S. T. M. standard colorimetric test for organic impurities. A sieve analysis of the samples indicated a well-graded aggregate.

The aggregate is trucked from the plant, a large portion being used at the city of Devils Lake and other communities in the vicinity. In the first year of operation, 6000 cu. yd. were furnished for a school house in Devils Lake and a hospital job in the same town used another 1800 cu. yd.

#### Pipe Plant

Adjacent to the gravel operation, the company has constructed a plant for the production of concrete pipe. The building is a two-story frame structure with overhead bins at one end for the storage of aggregate. The material is raised to the bins by a bucket elevator and from the bins is delivered directly to a one-bag Wonder mixer.

The pipe are made on a Quinn vibrator table, capable of making sizes from 10 in. to 48-in. Later an internal vibrator will be installed at the plant so larger sizes, up to 72-in., can be produced. The forms used are Quinn, also.

Curing is done in the open at the Devils Lake plant, but, otherwise this plant is very nearly identical with the company's plant at Fargo, which was described in an earlier issue. At the latter plant curing is done in long, steam-heated, curing rooms, so that the operation at the plant can be carried on all winter.

The company officials state that its Fargo plant is the only operation between Minnesota and the Pacific Northwest—a stretch of some 1200 miles—which is equipped with heated curing rooms where winter curing can be carried out in spite of the extremely rigorous climate. It is contemplated that similar curing rooms will be added at the Devils' Lake plant, but at the present time no winter operations are being carried on.

The day's run at the Devils Lake plant is usually made up of several different pipe sizes as the demand in the

district is quite varied, and the shorter operating and curing season makes it necessary to turn out a wide variety on short notice. An average run, when a single size is being made, is 120 ft. of 36-in. pipe in a day.

All of the pipe are trucked out, the largest part being used on state and county highway jobs. Other pipe go to Devils Lake or to the towns of Carrington, New Rockford, Lakota, and Cando, all situated within a radius of about 50 miles of the plant.

Since the plant is built some miles outside of the city of Devils Lake, and on the Indian reservation, there were no facilities for employees and officials on the site. The company has therefore built a two-story modern frame house on the property for the use of the superintendent, so that he will be in close contact with the work at all times.

#### Large Pipe Machine

ZEIDLER CONCRETE MACHINERY Co., Waterloo, Iowa, manufacturer of concrete pipe and concrete pipe machinery, has installed a new large machine for making 8- to 36-in. pipe up to 8 ft. in length. This is said to be the first installation of machinery in the United States for the manufacture of pipe of this length.

#### Branch Pipe Plant

CHOCTAW CULVERT AND MACHINERY Co., Memphis, Tenn., recently began production at its new Columbus, Miss., concrete culvert and pipe plant. Highway and railway culverts and sewer, drainage and sanitary pipe are among the products to be manufactured. Steam cured pipe will be made up to 36 in. in diameter and culverts as large as 8 ft. diameter.

#### Association Director

CALIFORNIA CONCRETE PRODUCTS, San Jose, Calif., H. F. Wiegand, was elected a director of the California Associated Concrete Manufacturers' convention in Fresno recently.

#### Concrete Brick

QUARTZITE STONE Co., Lincoln, Kan., is reported to be considering the manufacture of concrete brick as a by-product industry, to profitably make use of stone screenings.

#### Ready-Mix Expansion

ATLANTA AGGREGATE Co., Atlanta, Ga., has purchased six additional ready-mix concrete delivery trucks, which will enable the company to supply concrete for any sized job as fast as the contractor can handle it. One of the larger projects being furnished at the present time is the Cheshire bridge.

#### New Batching Plant

MASSAPONAX SAND AND GRAVEL CORP., Fredericksburg, Va., Chas. L. Ruffin, president, has recently completed a new ready-mix concrete batching plant at 2600 New York Ave., N. E., Washington, D. C. The Averill bin has a capacity of 350 tons, divided as follows: 100 tons of sand; 100 tons large gravel; 150 tons small gravel. There is also a separate bin for building sand. Johnson batching scales of 4 cu. ft. capacity are used for proportioning. Cement is obtained from a separate bin. A Link-Belt belt conveyor, 250 ft. centers, fills the bins, and a clamshell bucket on a stationary crane supplies the conveyor hopper. Ten mixer trucks, Jaeger, Blaw-Knox and Rex, are used to make and deliver the ready-mix concrete.



New ready-mix concrete batching plant in Washington, D. C.



## MERCHANDISING

# CONCRETE PRODUCTS

### Part 5—Advertising

By H. O. Hayes

**I**N LAST MONTH'S ARTICLE we considered the basic objectives of advertising, the various advertising mediums suitable for concrete products manufacturers, and the use and characteristics of these mediums.

In this article let us consider those fundamentals which should be taken into account in selecting or preparing advertisements.

Whether we write our own ads, have an advertising agency prepare them, or get them from a service organization, a knowledge of these fundamentals will enable us to criticize and improve them, or to make a more intelligent selection.

#### Audience

First we must have a clear picture of the audience to whom we are talking. If we are planning an advertisement for a contractor or building paper the copy may feature savings which result to the contractor by using concrete masonry. But, if the advertisement is being prepared for the local newspaper our story should be prepared to appeal to the prospective owner of homes. To do this beauty, firesafety, permanence and economy should be featured.

With the audience clearly in mind the next problem in planning the advertisement is to determine the objective. If it is to be a contractor ad, is it desired to win new customers? Is it hoped to get contractors to accept a new use of your products, say for above ground construction in addition to foundations?

Or is it merely to build good will, so that contractors will be sure to think of *you* first when they need concrete units? Or perhaps your sole objective may be to tie in your products as the local source for materials required for the nationally advertised concrete house.

If the ad is to appeal to the consumers, similar questions should be considered and answered before starting to prepare it. Or, the objective may be to

help an operative builder or realtor-builder sell the houses he has built of your units. So, determination of the objective of the advertisement is the second step of the process of preparing the ad.

The third step is to determine the action you want the prospect to take. Have you some facts you want to interest the contractor in? Do you want to get him to ask you for those facts? Have you a product you want to demonstrate to him? Is there a model house, or a demonstration construction job you would like prospective buyers to visit? So, for step three, set your objective so you can direct your story to it.

With the thinking thus cleared rapid progress can be made in the preparation of the ad. But the importance of the preliminary work must not be overlooked or discounted.

#### Fundamentals

Now for some fundamentals in preparing an effective advertisement. The effective advertisement must attract attention. For what have you accomplished if readers skim over your display without seeing or reading? It is one thing to run an ad. It is quite another matter to have it read. And the first requirement in having it read is to have the ad attract the favorable attention of readers of the publication.

The simplest way to do this is to contract for large space, or to use color with large display. But that costs money. So, for limited budgets, other devices must be used. These include:

1. Appealing illustrations.
2. Eye-catchers.
3. Startling headlines.

Here is what Dr. Gallup, a well-known advertising researcher, says about advertising illustrations:

1. "In any mass appeal advertising the reader interest of an ad is a direct reflection of the human interest of the illustrations.
2. "Ads illustrated by photographs

attract more readers than ads illustrated with either wash or line drawings.

3. "Ads illustrated with photographs of children exert most universal appeal; those featuring groups of people rank second; sport scenes third; scenery fourth; animals fifth.

It might be well to remember these facts so that you will always be conscious of them when preparing your advertisements. In applying these rules to homes, have a good photograph of an attractive house. See that there is life in the picture. When you have a photograph taken of a house, try to get children, women, or some form of life, such as a dog playing, in the picture.

A close-up of an entrance way, the fireplace, or other interesting detail which flatters your products and which breathes livability as well may be more effective than a general view of the entire house.

Eye-catchers are novel designs—borders, etc.—which stand out on the printed page because of their unusual appearance. If a very small space is to be used, this method of attracting attention is desirable.

For space of medium size, if satisfactory photographs can't be obtained, startling or catchy headlines will help win the attention of readers. This requires something newsy, or a special offer of some kind. It is also possible to emphasize some feature of your product in the headlines in a way which may be strengthened by a drawing which will help visualize the major thought. A wide white border around the ad is another device which can be used to help set it off from the rest of the page. This means is especially helpful when no illustrations or trick layout is used.

With many people there is a popular misconception that good advertising must be clever, or funny, or freakish. While advertisements of this type are used successfully by a number of the

ASK US ABOUT  
**Firesafe  
 CONCRETE  
 Homes**

YOUR NAME, ADDRESS  
 AND PHONE NUMBER

best merchandising organizations in the country, great skill is required to handle them successfully. So for the average advertiser, it is well to follow the rule that freakishness has no more place in advertising than it has in personal selling.

A good way to get a better understanding of what good advertising of building materials consists of is to study current advertising of other building materials. Take a number of recent issues of the *Saturday Evening Post*, *Colliers*, *American Home*, *Better Homes and Gardens*, *House and Garden*, and other similar magazines and tear out all of the advertisements that you see on building products. Get the smaller ads, as well as the full page ones.

Now study these to see what leading manufacturers of building materials

and products do to attract attention. Is it a picture that first draws your attention to the ad? Is it a big, or startling headline? Or is it a splash of color?

Study the illustration! Does it give you details of construction? Or does it show people enjoying the benefits of the products advertised? If there are illustrations of both types in the ad, which one is most prominent? Also note the way the secondary illustration is used?

As a suggestion of how these two types of illustrations might be combined for a concrete masonry advertisement, a large illustration of a beautiful home might be shown, with the lady of the house sitting on the porch. Then, to emphasize the fact that the house is concrete, a close-up view of the wall surface might be shown, revealing an interesting ashlar pattern or a good texture of the units.

Decide who the illustration is planned to appeal to. Analyze what there is about the picture that stimulates your interest or curiosity. Or what might be done to make it of real interest.

Then study the headlines in the same way. And see how the headline is tied in with the illustration.

Now go a little farther. See how the eye and mind are carried from illustration to headline to copy. The real goal to strive for is to get the message in the copy read. Note how quickly a big story is told—how few words are used—how complete the story is—and finally, how the reader is urged to take some definite action—to do something which will lead toward a sale.

As you study these details remember that the advertisements were prepared to sell some particular material to someone who plans to build a home. And that is one of your problems in any advertising you do in local newspapers.

After you have studied advertisements from general magazines, get some contractor magazines such as *American Builder* and *Practical Builder* and study the advertisements in the same way, this time remembering that the advertisements have as their objective the winning of contractor approval.

Note the difference in the advertisements of the same advertisers in the magazines reaching different types of readers. Study the difference in the head lines. And the difference in the story told. Study the aim, or goal, of each advertisement. And note how action is urged.

While the concrete products manufacturer's job is different in some respects, remember that many of your objectives are the same, and that some adaptation of the story told in a number of these advertisements may be a smart presentation for you to make.

If you write your own advertisements, looking over a selection of the better

ads being used by leading manufacturers may give you a clue to a story which you can use.

One advertiser periodically collects a series of advertisements this way and has all the head lines copied. He also keeps a file of illustrations that seem fitting to his product. When he has to write an ad he just runs through these headlines until he finds one that gives him an idea, and proceeds to apply it to his own story.

Whether you are writing your own ads, or having them prepared, the study

**SNAP YOUR FINGERS  
 AT FIRE**

**Fire is no menace when your garage is built of concrete masonry. Protects your car. Protects your home. Adds to the beauty and value of your property—yet costs amazingly little to build. Ask us for prices.**

**YOUR NAME, ADDRESS AND PHONE NUMBER HERE**

suggested is an excellent way to get a practical understanding of the fundamentals of good advertising. And it should repay one well for the time spent in study.

While this may seem to require an unjustifiable amount of time for one phase of the business, remember that when you are right with your product and price, advertising enables you to be right on a big scale. Used intelligently, studiously, in patient, courageous experimentation toward a definite goal you have in mind, advertising can work miracles for you.

**IT COSTS LESS  
 TO OWN A  
 FIRESAFE  
 Concrete Home**

**BEAUTIFUL  
 DURABLE  
 DAMP PROOF  
 TERMITE PROOF**  
*See Us before you build.*

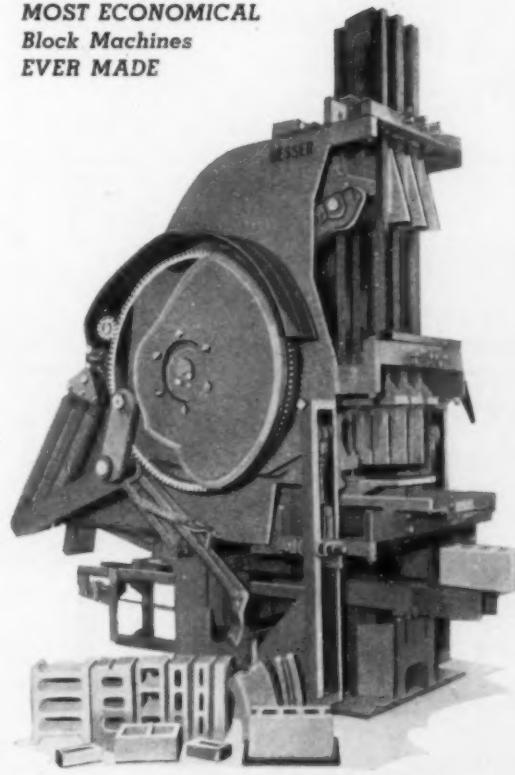
**YOUR NAME, ADDRESS  
 AND PHONE NUMBER**

# The Greatest Advance Ever Made in Concrete Building Units

## THE FULLY PRESSED TOP

Edges and Corners Like Cut Stone

The SIMPLEST and  
MOST ECONOMICAL  
Block Machines  
EVER MADE



### BESSER PLAIN PALLET STRIPPERS

A Size and Model for Any Size Plant

FULLY AUTOMATIC—3 Models—Capacities: 2000 to 4000 units per day.

SEMI-AUTOMATIC—4 Models—Capacities: 1000 to 2000 units per day.

POWER OPERATED with Hand Controls—2 Models—Capacities: 500 to 1000 units per day.

MULTI-MOLD Hand Operated—Capacity: up to 300 units per day. For manhole blocks, slabs and small cored units.

AUTOMATIC BRICK MACHINES—Capacities from 10,000 to 50,000 units per day. For brick, slabs, coal cubes and other small units.

There has long been a demand for concrete masonry units of more clean-cut appearance for use in higher class construction. The new units with *fully pressed top*—an exclusive product of Besser Plain Pallet Stripper—now completely meet the most exacting requirements of architects and builders. These units, which cost even less to make on the new Besser Machines, have opened new markets and have made the concrete products industry a far bigger, more attractive and more profitable business.

### Possible Only with Besser Pallets

These new units with fully pressed top are the result of further refining and simplifying the original Besser principle of making all units on one set of plain pallets. This has not only brought the initial cost and operating cost far lower than any before known, but has raised the standard of quality and appearance of concrete masonry units to a new high level.



WOOD  
OR  
STEEL

### Besser Nine Bar Tamper

The new Besser Nine Bar Tamper has proved to be the correct multiple tamper arrangement for producing absolutely even density in walls, webs and corners of all types of units. This and other inherent features of the new Besser Plain Pallet Stripper, including Automatic Off-bearing, will enable you to make BETTER blocks, FASTER and for LESS COST on Besser Machines.

Ask for the New Besser Plain Pallet Stripper Catalog

## BESSER MANUFACTURING CO.

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL, HOBBS, UNIVERSAL, PORTLAND

204 37TH STREET

ALPENA, MICHIGAN

EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER

## **Idaho Phosphate**

IDAHO STATE has approved a phosphate commission to aid in development of Idaho's Phosphate deposits in southeastern counties. An appropriation of \$20,000 is provided in the bill.

## **Talc Plant**

JOHN MOORHOUSE MINING Co., is planning to ship 200 tons of talc a week from the newly opened talc mine near Ibex Springs, Calif. The company has a five year lease on the property, which is being worked on two shifts.

## **Large Limestone Order**

INTERNATIONAL LIME CORP., LTD., British Columbia, Canada, has a contract for 90,000 tons of lime rock to be shipped to the United States. The first shipment was made from the Nelson Island quarries early in March.

### **SPRAY CONCRETE**

BLOCKS—VAULTS—WALLS  
Ornamental Casts, etc.  
with ADJUSTABLE CEMENT SPRAY  
\$15.00 and \$17.00

**Eureka Art Stone Works**  
Box 602, Eureka, Calif.

### **SPECIAL AGGREGATES**

#### **SPARKLING MARBLE SPARKLING GRANITE**

All colors—all sizes  
TAMMS SILICA COMPANY  
228 North La Salle Street Chicago, Illinois

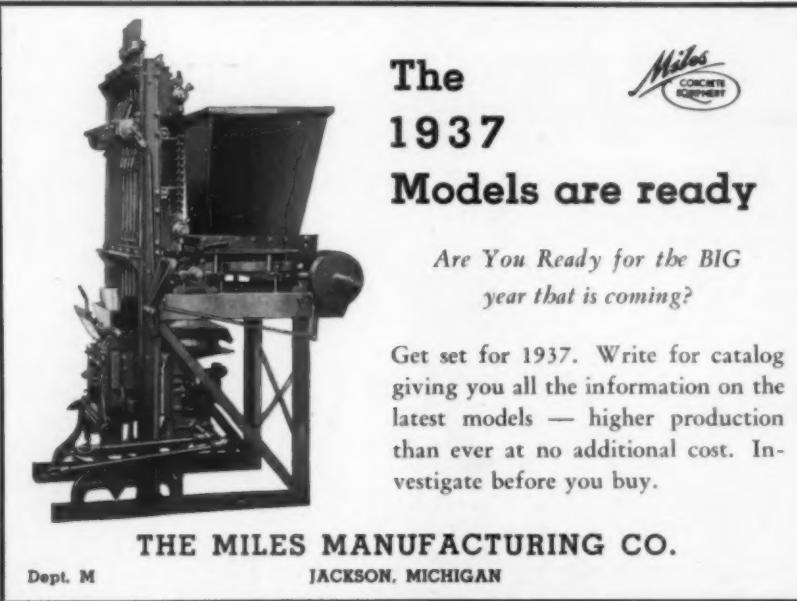
### **CEMENT COLORS**

#### **CEMENT COLORS**

*Will not fade—extra fine and strong*  
TAMMS SILICA COMPANY  
228 North La Salle St. Chicago, Illinois

### **STAR and ANCHOR COLORS**

Geo. S. McPham Corp., East St. Louis, Ill.  
C. K. Williams and Co., Easton, Penn.



**The  
1937  
Models are ready**

*Are You Ready for the BIG  
year that is coming?*

Get set for 1937. Write for catalog giving you all the information on the latest models — higher production than ever at no additional cost. Investigate before you buy.

**THE MILES MANUFACTURING CO.**  
JACKSON, MICHIGAN

**Miles  
CONCRETE EQUIPMENT**

## **45% - 50% Air Space Utilized in Curing with Cored Pallets**

**CORED PALLETS** produce faster and more uniform drying of units—reducing breakage.

**CORED PALLETS** are made individual for each size of unit— are lighter to handle. Maximum drying capacity in cars is obtainable—units can be closely spaced—air circulation is not impaired.

**CORED PALLETS** give a greater flexibility to your operations with a corresponding smaller pallet investment.

**"COMMERCIAL MANUFACTURES THE ONLY  
COMPLETE LINE OF STEEL PALLETS"**

*Write for full details*

### **THE COMMERCIAL SHEARING AND STAMPING COMPANY**

Youngstown, Ohio

## **LOW INITIAL COST LOW MAINTENANCE COST**

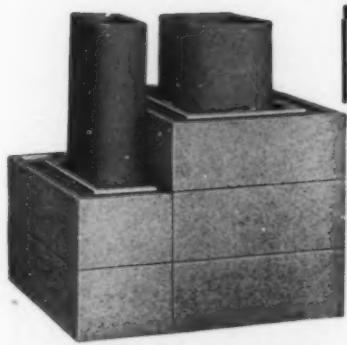


Save money on your production costs by installing Chase Lift Truck Rack or Concrete Cars with Chase Patented Spring bearings—dust proof, oil retaining flexible boxings with roller bearings. Used and recommended in most of the concrete plants.

**WRITE  
For Catalog and  
Special Low Prices**

Complete line of concrete block cars, decks, Lift Truck Racks, transfer cars, turntables, dump cars, etc.

**CHASE DRYER CARS &  
TRANSFER CARS**  
CHASE FOUNDRY & MFG. CO.  
COLUMBUS, OHIO



Light Weight Flue Block

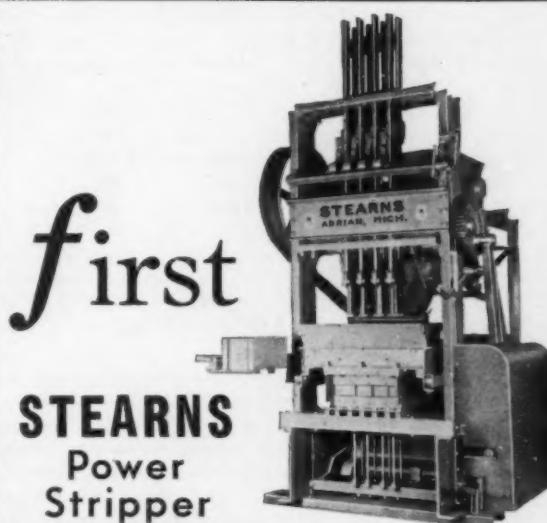
**\$30  
TO  
\$50**

**Profit  
Daily  
Blocks**

Others are making it with a MULTIPLEX Flue Block Machine. Only a small investment required. Don't overlook this profitable end of the Concrete Products business. A Multiplex Flue Block will meet the requirements of any code or specifications. Like all Multiplex Machines, the flue block machine is simple and dependable—free from troublesome parts and gadgets. Thousands of these machines are now earning substantial profits for their users.

Whether you are interested in the manufacture of flue blocks—concrete building blocks—cinder blocks—Random Ashlar or other concrete building units—be sure to see what the old reliable, MULTIPLEX has to offer. Write for literature.

**MULTIPLEX CONCRETE MACH. CO.  
ELMORE, OHIO**



**first  
STEARNS  
Power  
Stripper**

First in quality of blocks produced.

First in output per man.

Lowest initial investment for equipment of like capacity per man.

Lowest in operating and maintenance cost.

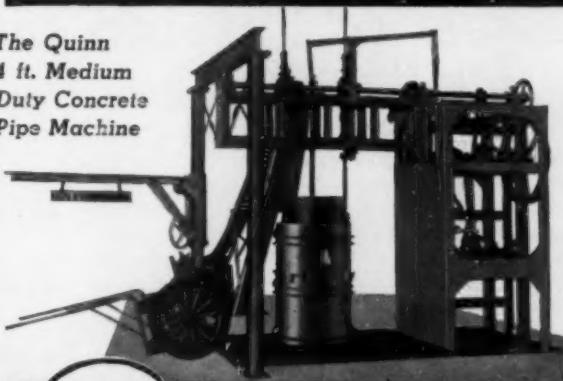
That's the Stearns Power Stripper. Write today for circular about the low-cost manufacture of concrete building units.

**STEARNS MANUFACTURING COMPANY, Adrian, Mich.**

Eugene F. Olsen, General Manager

Ask also about Stearns Multiple Bar Tampers, Stearns Mixers and guaranteed repair parts for Ideal Mixers and Anchor, Ideal, Universal and Hobbs Block Machines

The Quinn  
4 ft. Medium  
Duty Concrete  
Pipe Machine



**QINN QUALITY  
CONCRETE  
PIPE**

**The Pipe That Will  
Always Make Good!**

"Quinn Process" concrete pipe surpasses most specifications because of its 60% greater compression test and lowest absorption. "Quinn Process" produces strong, sturdy, long lasting, smooth finished pipe.

Make better pipe in all sizes, at lower cost, with Quinn Concrete Pipe Equipment. Write for information and prices on Quinn equipment for producing all types of concrete pipe quicker, better and more economically.

**QUINN 4 ft. Medium Duty  
PIPE MACHINE**

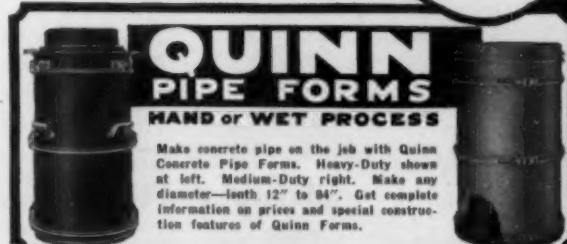
The Quinn 4-foot Medium Duty Concrete Pipe Machine, shown above, makes pipe 12" to 60" in diameter in 30", 36" and 48" lengths. Machine tamping, 400-pound trip-hammer action blows at rate of 370 per minute packs concrete in dense mass—produces smooth finish pipe of super-strength and lowest absorption.

Our 6-foot Machine makes pipe 12" to 60" in diameter in 36", 48" and 72" lengths. This Machine has capacity up to 100 tons a day. Write for details, capacities, costs, etc.

**QUINN WIRE & IRON WORKS  
1603 Twelfth Street  
BOONE, IOWA**

**QUINN  
STANDARD**

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# Digest of Foreign Literature

By F. O. ANDEREGG,

Consulting Specialist in Building Materials, Newark, Ohio

*The Relation Between Tensile and Compressive Strengths of Mortar and Concrete.*—To celebrate the completion of half a century of distinguished service as head of the French Laboratory of Bridges and Roads, the dean of world concrete technicians, Robert Feret, has made a very thorough study of strength relations in mortar and concrete. He has not only used the results of the many experiments made in his laboratory, but also carefully considered the most reliable results published, including the results obtained by Abrams and Gonnerman. His final conclusion is that compressive strength is more reliable than either tensile or flexural strength for determining the actual concrete strength, the reason being that tensile or flexural strengths are apt to be greatly affected by the surface condition of the test specimens.

Numerous series of tests are plotted using the square root,  $R$ , of compressive strength, the first power of tensile strength,  $T$ , or of flexural strength,  $F$ , plotted against each other or against  $\gamma$ , the concentration of the cement in the paste. In any one of most of these series  $R$ ,  $T$  or  $F$  was found to be proportional to  $\gamma$ , although the slope and intercept with the  $X$ -axis varied from set to set. It was also found usually that  $R$  was proportional to  $T$  or  $F$  in a given series, but with different constants for different conditions. For standard and high early strength portlands, for natural cements, for pozzolanic cements and for aluminous cements,  $T = 2R - 6 \text{ kg./cm.}^2$  or  $T = 7.6R - 85 \text{ lb. per sq. in.}$ , where  $R$  is the square root of the compressive strength. For hydraulic limes,  $T = 6.25R - 43 \text{ lb. per sq. in.}$ , while for mixtures of slag and lime,  $T = 7.6R - 71$  and for the Sulfate cements, which are mixtures of slag and gypsum,  $T = 6.7R - 85$ . For the pounded-in, earth-dry specimens made according to German specifications,  $T = 6.1R - 51$ , while for German plastic mortars  $T = 3.85R - 81$ . On this basis one test may be sufficient to test a cement and it is hardly worth while expecting to get tensile strength results higher than given by these formulas.

Only rarely among the numerous series studied, so long as the conditions were not varied too greatly, was  $R$  not proportional to the concentration of cement in the paste  $\gamma$ , and deviations were generally within  $\pm 20$  per cent. Further refinements might be made by

considering only the part of the cement hydrated and by correcting for that part of the water entering into combination. Tensile and flexural strengths, however, were found to have a much greater scatter, indicating them to be much more sensitive to changing conditions than compressive strengths. Where the tensile or flexural strengths relative to  $\gamma$  did vary from this linear relation, still on plotting against  $R$ , a straight line relationship was almost always found. Most of these straight lines would intercept the  $X$ -axis on the positive side, indicating that tensile or flexural strengths increase more rapidly than the square root of the compressive strength; but in some cases the intersection was to the left of the origin indicating the reverse effect.

When several factors were varied simultaneously, a series of straight lines forming a net work was obtained, although practically, the deviations were often small enough to permit merging into a single line. Because of the consistent proportionality between  $T$  or  $F$  and  $R$ , it may be inferred that this relation must be a rational consequence of the properties of matter. But on trying to follow this thought to a logical conclusion, the fact is encountered that concrete is not a homogeneous system; the different kinds of aggregate and their random distribution, as well as variations in viscosity of the binder result in so variable a stress distribution through the mass, that satisfactory mathematical analysis is almost impossible. In the second place these assemblages are not perfectly elastic, so that the application of loads sets up strains in localized areas, leading to premature rupture.

The results obtained by experimental tests do not give the true strengths of the materials. Not only do they vary with the speed of testing, but they are also greatly influenced by the manner of the application of the load. In making tensile tests the chief source of error is that the stress is always greater at the edge than in the middle of the section, giving results much lower than the true strengths. In flexure, the results calculated from the moment are true only if the deflections are proportional to the internal tension clear up to the breaking point. It has been shown, however, that they increase more rapidly, so that the results obtained are actually higher than the true strengths. As is well known, flexural

results usually run about double tensile values. In compression, the results obtained by crushing cubes, prisms or cylinders between parallel plates, with or without the interposition of an elastic body, depend upon several conditions, of which the end condition of the specimen is probably most important.

Anything that influences the condition of the surface of the specimens, such as extra troweling, or the use of richer mortar at the surface, has far greater effect on flexural than on compressive strength. Difference in composition of specimens is most marked usually between the center and the surface. It is quite important in mortar and concrete specimens and is the cause of most of the variation in the results observed. A number of causes contribute to this difference: (1) During molding, non-spherical aggregates suffer orientation and the finest particles are worked toward the surface, especially in the softer mixes. (2) During setting and hardening, the temperature is apt to vary from the outside to the center, so that the setting and hardening do not occur in a uniform manner throughout the specimen. The atmosphere surrounding the specimen often alters the surface, whether by leaching out lime or by carbonating free lime, or by aiding in crust formation. (3) Volume changes, both expansion and contraction, often set up stresses and strains within the specimens which seriously affect results.

Slag and puzzolanic cements seem to be quite subject to surface changes with consequent resultant action on strengths; for instance, with wet storage,  $T$  increases faster than  $R$ , while under dry conditions the reverse is true. Specimens cured in contact with aggressive solutions, such as sea water, suffer superficial damage so that  $T$  and  $F$  fall with respect to  $R$ . The greater the size of coarse aggregate the greater the difference between surface and center and the greater the diversity between  $T$  and  $R$ .

In view of the importance of this surface condition and in view of its effect on tensile and on flexural strength, it would seem logical to use compressive breaks as giving the most reliable evaluation of the true strength of a concrete or mortar, except in those cases where structural strength, in which the surface conditions may play an important part, is involved. This conclusion is based on the results obtained from 41 series of tests in tension and 37 in compression.

*Revue des Matériaux de Construction et de Travaux Publics.* (1936) No. 318, p. 49; No. 319, p. 73; No. 320, p. 97; No. 321, p. 121; No. 322, p. 145; No. 323, p. 175; No. 324, p. 193; No. 325, p. 219; No. 326, p. 241.



## THE INDUSTRY

### New Incorporations

**The Multiplex Concrete Products, Inc.**, Lyndhurst, N. J.; \$125,000. Agent is William L. Bivona.

**Marcoform, Inc.**, Camden, N. J.; cement and cinder blocks; 99 shares, no par. Agent is John R. Phillips.

**Red River Stone Co.**, Little Rock, Ark. Incorporators are A. W. Warren and R. E. Wilson, Boyle Bldg.

**Vacuum Concrete Products Corp.**, New York, N. Y., incorporated in Delaware; \$275,000 to \$350,000.

**Franklin Mica Corp.**, Roanoke, Va.; capital, \$25,000. Incorporators are E. M. Foster and Holman Willis, Mountain Trust Bldg.

**Tulsa Portland Cement Co.**, Delaware; capital in Oklahoma, \$10,000. Katherine Manton, 1126 N. Rob, Oklahoma City, Okla., service agent.

**Lime Products, Inc.**, Wilmington, Del.; to deal in limestone and other minerals; \$1000. Incorporators are Walter Lenz, B. R. Jones and J. P. Murray.

**Independent Gravel Co.**, Joplin, Mo., notice of entry into Arkansas. The company will use \$10,000 of its capital in operation of its business in Arkansas.

**Marion Gravel Co., Inc.**, Marion, Ind., change of address to Union Trust Bldg., Union City, Ind., and change of resident agent to John Wilson, Winchester.

**Porous Concrete Drain Pipe Corp.**, 51 Newark St., Hoboken, N. J.; capital stock, 2500 shares, no par value. Incorporators are Adrienne Roggio, Jack R. Zall and Maurice H. Klein.

**Northwest Lime Co.**, Portland, Ore.; capital stock, \$1000, and 1000 shares common, no par value. Incorporators are Charles A. Bingham, P. M. Robinson, Robert H. Strong and James Cole.

**Sand Mountain Sand Corp.**, Wytheville, Va.; to mine and deal in sand, silica, clay, pigments, ores, minerals and metals; maximum capital, \$50,000. C. R. Huddle, Ivanhoe, Va., is president.

**Richmond Sand and Gravel Corp.**, Richmond, Va., has changed location of its principal office from 434 W. York St., Norfolk, Va., to 3011 Dock St., Richmond, Va. Albert G. Laun is president.

**Blue Jay Cast Stone Co.**, Madison, Wis.; to manufacture cast stone, concrete slabs, etc.; \$5000 preferred, or 50 shares at \$100 each and 100 shares, no par value. Incorporators are Charles Clare, F. C. Suhr, Roy A. Gannon.

### Personals

**Benjamin F. Affleck**, former president of Universal Atlas Cement Co., Chicago, Ill., has been elected chairman of the board of Republic Realty Mortgage Corp., Chicago.

**Col. Daniel D. Thompson**, president of the Kentucky Rock Asphalt Co., Louisville, Ky., has been elected president of the Louisville Convention and Publicity League.

**Marion S. Ackerman**, vice-president of Lawrence Portland Cement Co., New York, N. Y., started his 51st year of service with his company March 1. He joined the firm in 1887 as an office boy.

**W. H. Price**, president, Gibsonburg Lime Products Co., was shaken and bruised in an automobile accident west of Genoa, Ohio, early in March. He was returning from Toledo when his car was hit by a truck.

**John A. Miller**, president of Pennsylvania-Dixie Cement Corp., New York, N. Y., lost his 50-ft. cabin cruiser, "Carlotta," March 13, at Georgetown, S. C., through fire caused by an explosion of undetermined origin.

**B. L. Prater**, superintendent of Modern Sand and Gravel Co., Pacific, Mo., resigned March 1. It is believed he has accepted a position in St. Louis. Mr. Prater came to Pacific four years ago from St. Charles, Mo., where he was also connected with the gravel industry.

**Jose V. Bagtas** resigned January 31 as general manager of Cebu Portland Cement Co., Manila, P. I. In accepting the resignation, the board of directors made of record its appreciation of his excellent administration. Mr. Bagtas has completed 21 years' service with the government.

**Thomas C. L. Nugent**, president of the Nugent Sand Co., Louisville, Ky., was injured March 13 in an auto crash a mile west of Greencastle, Ind. His wife, Mrs. Edith Nugent, was killed in the accident. Just twelve days later, Mr. Nugent also lost his mother, Mrs. Katherine E. Nugent.

**O. H. Stanard**, for the past eight years associated with the American Limestone Co., Knoxville, Tenn., in the South Carolina territory, has been transferred to North Carolina to replace D. S. Coltrane, who recently took a position with the North Carolina State Department of Agriculture. Mr. Stanard is a former county farm demonstration agent of Durham county, N. C.

**R. L. Bowron**, assistant general superintendent of the Tennessee Coal, Iron & Railroad Co.'s works at Ensley, Ala., recently described, before a meeting of the Ensley Merchants and Associated Business Men, the operation of the soil-conditioner plant—the only one of its kind in the country—which manufactures fertilizer from slag.

**Edward M. Brickett** has been appointed engineer in charge of concrete control work for The Thompson & Lichten Co., Inc., Boston, Mass. Mr. Brickett is a graduate of the Massachusetts Institute of Technology with S.B. degree and of the University of Illinois with S.M. degree. He has a broad background of accomplishments in concrete and construction. While in charge of the research laboratory of the Lehigh Portland Cement Co. for a considerable period, he carried through numerous studies of concrete. He is the author of a number of important technical papers.

### Obituaries

**Charles Hild**, 75, Chicago, Ill., an official of the Wisconsin Lime and Cement Co. for the last twenty years, died February 21 after an illness of several months.

**Orson W. Knight**, 71, Topeka, Kan., died March 13. In 1910 he bought the Topeka Sand Co., which he operated until 1918. Since 1920, he had been head of the River Sand Co.

**Raymond H. Cherry**, 43, sales manager of the Wire Rope Division of Wickwire Spencer Steel Co., New York, N. Y., for the past seven years, died at his home in Westfield, N. J., March 20, after an illness of several weeks. He was employed by American Steel and Wire Co. from 1909 till 1930, except for the time he served in the World War. Then he came to Wickwire Spencer.

**H. J. Stannert**, president and general manager of West Branch Sand and Gravel Co., died of a heart condition March 17 at his home in Northumberland, Penn. In 1918, with Harry Crouser, Mr. Stannert purchased a controlling interest in the Covert-Carson Sand Co., Linden, Penn., and formed the partnership of Stannert-Crouser-Carson. Later, Mr. Stannert bought out Mr. Carson, and, after several years of operation of the Arch Gilmore plant above the Arch Street Bridge, Newberry, the combine bought out the D. N. Thomas Sand and Gravel Co. and formed the present West Branch Sand and Gravel Co.



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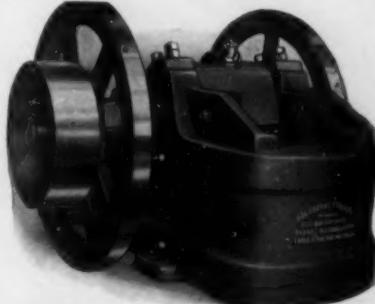
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17 John Street New York, N. Y.

Wm. A. Harting, who founded the Harting Supply Co., Lansdowne, Baltimore country, Md., in 1907 and was one of the pioneer concrete block manufacturers in the Baltimore area, died February 12.

### Crushed Stone

Jasper, Ala.: The county has purchased a rock crusher for \$4500.

Providence, R. I.: The city is planning to quarry its own stone.

Hartshorne, Okla.: The city is planning to secure a crusher to produce road material.

Frederika, Iowa: A WPA rock crushing project was started at the close of February, employing 25 men.

Independence, Iowa: Rock crushing is progressing at the Close quarry, and four miles of road have been surfaced.

Morristown, Ohio: Township trustees have opened a limestone quarry on the Barr property, southwest of town.

Fairmont, Mo.: The state highway department is preparing to crush rock for use on the Coffey road near here.

Waverly, Iowa: A new roll crusher has been installed at the Schied quarry to increase production to 100 tons a day.

Fredonia, Kan.: WPA workers are starting a rock quarry on the A. R. Runnels place for bridge work and county roads.

Cleveland, Tenn.: Bradley county court has purchased a new \$2390 rock crusher and has been given an allowance of \$990 for two old crushers.

Lincoln, Neb.: The county has leased 15 acres of land for a WPA stone quarry near Roca from Maurice M. Dalton. The terms are 5¢ a cu. yd.

St. James, Mo.: Farmers in Dillon community are operating a limestone crushing project on the farm of Orville Pilger under leadership of William Lupperger.

A glimpse of the Link Belt display at the National Railway Appliances Exhibition held in Chicago, March 15 to 18. The young lady is demonstrating the ease of operation of the new Speed-o-Matic shovel



W. S. Brimijoin, 53, safety engineer for Hercules Powder Co., Wilmington, Del., died March 23 after an illness of several weeks. He had been with the organization for over 30 years.

Valley Center, Kan.: Butler county has been authorized to purchase a stone crushing plant in the county at a cost of \$56,100. WPA will pay \$43,094 of the total.

Hamilton, Mo.: Rock crushers on WPA work in the county have been in continuous operation. Rock is being used to improve roads, and much has been stockpiled.

Orrick, Mo.: The Orrick special road district has moved its equipment from the Ben Hall quarry to the William Paulson quarry. The next project will be the Elkborn road.

Tawas City, Mich.: The rock crushing plant owned by Iosco county was damaged to the extent of \$5000 by fire February 25. Defective wiring is believed to have caused the trouble.

Jasper, Ga.: Pickens county has purchased a rock crusher for \$3500 and is operating it for production of road material. Cherokee county is also contemplating road improvements.

Drumright, Okla.: The county's WPA mineral surveys project, halted last December, was resumed recently. Mapping of mineral and natural resources, particularly native stone, limestone, water resources, etc., is planned.

Fred Bauer, Hastings, Minn., has purchased a crusher and motor and has begun operation on Nick Meyer's farm to produce agricultural limestone. He is employing his own labor and is charging \$1.35 a ton for the stone at the quarry.

Frankfort, Ky.: A rock crusher has been erected in the quarry on Lawrenceburg pike for operation of a county quarry with WPA labor. The crusher is being rented from Meade county, and the rental will apply on the purchase price if it is decided to buy the crusher.

Salem, Ore.: The county is operating a rock crusher near the Illahee school house. A recent blast loosened 30,000 or 40,000 cu. yd. of rock. The county court has granted Harold Blake, contractor, permission to haul poles and reopen his rock crushing plant in the Morningside district. He will furnish rock for the new Pacific highway location south of town.

Cambridge, Ohio: The county is operating a WPA stone crushing project on the property of James B. Fairchild, Adams township. The program involves expenditure of over \$200,000 and will include improvement of about 56 miles of roads. The county pays 10¢ a cu. yd. for rock removed, and also gives Mr. Fairchild all the dust produced in crushing.

Zumbro Falls, Minn.: WPA has allotted about \$47,300 to continue quarry operations in Wabasha county, near Plainview and Lake City. The project provides for quarries in Pepin, Lake, Watona, West Albany, Gilford, Chester, Plainview and Greenfield townships, to produce crushed limestone for surfacing farm-to-market roads.

Long Beach, Calif.: At a special meeting called to consider proposed establishment of an asphalt and rock crushing plant just outside of the city limits, the City Planning Commission asked the county to zone county territory adjoining cities, to prevent the encroachment of industrial development. County industrial zones would adjoin city industrial zones under the proposed plan.

### Sand and Gravel

Charles Langer, Waterloo, Iowa, has purchased a new stone crusher, valued at \$5500, for use in the Langer gravel pit.

Bettendorf, Iowa: The city has leased, for two years at 4¢ a cu. yd., the gravel quarry east of town from Bettendorf county and will operate a WPA project to produce gravel for Scott county roads. The city has purchased a \$3800 tractor for street maintenance.

J. H. Nave, Clarkston, Wash., recently purchased equipment to double the capacity of his sand and gravel pit near the east end of Highland Ave. The purchase included 2000 ft. of  $\frac{1}{2}$ -in. and  $\frac{3}{4}$ -in. steel dragline cable, a 35-hp. motor and a 1- $\frac{1}{2}$ -yd. bucket. The daily capacity will be increased to 500 cu. yd.

### Manufacturers

Pangborn Corp., Hagerstown, Md., is making additions to its plant and equipment to cost about \$80,000.

White Motor Co., Cleveland, Ohio, is expanding to meet increased business demands and will spend more than two million dollars for building construction, machinery, tools, etc., in the next year and a half.

The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio, announces appointment as assistant secretary of Edmond C. Powers, who has been engaged for three years in technical writing for The Lincoln Electric Co.

Farrel-Birmingham Co., Inc., Ansonia, Conn., announces reelection of Nelson W. Pickering as president. Added to the board of directors was Franklin Farrel III, a member of the fourth generation of the Farrel family in direct descent from the founder to be actively associated with the company.

STERLING MACHINERY CORPORATION NEW YORK CITY, N.Y.

**Lincoln Electric Co.**, Cleveland, Ohio, has appointed John S. Humble as arc welding consultant for the Boston office.

**Firth-Sterling Steel Co.**, McKeesport, Penn., has completed plans for constructing a new warehouse in Detroit to double its facilities in that area.

**Lima Locomotive Works, Inc.**, Lima, Ohio, announces appointment of Boehck Equipment Co., 2404 W. Clybourn St., Milwaukee, Wis., as distributor of excavators in Wisconsin.

**Bucyrus-Erie Co.**, South Milwaukee, Wis., has appointed Abrams-Anderson Co., 10425 Northlawn Ave., Detroit, Mich., as distributor in southern Michigan. Ginsburg and Horan, 355 Walton Ave., New York, N. Y., have been made Bucyrus representatives in New York metropolitan area.

**Link-Belt Co.**, Chicago, Ill., announces election of two new directors: Bernard E. Sunny, Chicago, and James S. Watson, Indianapolis, succeed Arthur L. Lovermore, deceased, and Austin L. Adams, resigned. Staunton B. Peck, Chestnut Hill, Penn., and Harris Whittemore, Jr., Naugatuck, Conn., were reelected as directors.

**Iron & Steel Products, Inc.**, Chicago, Ill., announces that Ed Provost, well-known power plant and equipment engineer, is now associated with the company and that Adolph Waleski has been placed in charge of structural work, succeeding P. K. Freese, who recently resigned. They will be assisted by Art Loos.

**The Carnegie-Illinois Steel Corp.**, Johnstown, Penn., announces retirement from active duty of Arthur L. George, manager of sales, Lorain Division, under pension plan. Michael J. Kist has been appointed to fill the vacancy, effective April 1. Mr. George, aged 65, has been employed by the

company and its predecessors, the Johnson Co. and the Lorain Steel Co., continuously since August, 1895. Mr. Kist joined the Lorain Steel Co. in June, 1903.

**The Claude B. Schneible Co.**, Chicago, Ill., announces appointment of Paul J. Cnare to handle sales in Wisconsin and Minnesota from headquarters in Milwaukee. Charles C. Herman has been given charge of the Philadelphia office, which covers Eastern Pennsylvania, Maryland, Delaware and the lower New Jersey territory.

**Foot Bros. Gear and Machine Corp.**, Chicago, Ill., announces changes in territorial sales personnel: E. G. Akridge, who has been handling the territory on the North Side of Chicago, has been made direct factory representative in the Detroit territory, succeeding Thomas Lord, resigned. F. A. Emmons, Jr., takes over the area vacated by Mr. Akridge, and Harry Harrison has been appointed sales engineer in the Central territory in Chicago.

**Caterpillar Tractor Co.**, Peoria, Ill., announces the resignation, effective June 1, of H. P. Mee, vice-president, whose extensive citrus interests in California demand more and more of his personal attention. Mr. Mee joined the C. L. Best Tractor Co., predecessor of Caterpillar, 17 years ago and has been promoted successively to his various executive and administrative positions. E. R. ("Ed") Galvin has been appointed general sales manager as of March 1.

### Trade Literature

The following literature, recently published, is available, free, upon request to the respective sponsor:

**Unusual Report.** An annual report which is unusual in that it illustrates and lists the company's products on pages preceding

and following its president's message to stockholders and balance sheet is that for the year ending December 31, 1936, issued by **CHAIN BELT CO.**, Milwaukee, Wis.

**Quarry Supplies.** Catalog 3 covers a complete line of track and trolley products for mines and quarries. The 32-page book deals with seven new types of flash-weld rail bonds, trolley feeder relays, wobbler type trolley sliders, mining machine ground clamps, motor lead union connectors and other track devices. **MOSEBACH ELECTRIC AND SUPPLY CO.**, Pittsburgh, Penn.

**Cast Iron Roof.** "Uscast" roofs for industrial buildings—fire and wind proof and corrosion resistant to industrial gases—are illustrated in a folder of seven sheets. An assembly layout is included. **UNITED STATES PIPE AND FOUNDRY CO.**, Burlington, N. J.

**Potash.** "The Story of American Potash & Chemical Corp." is an attractive 32-page book describing and illustrating the derivation and manufacture of "Trona" potash salts, "Three Elephant" boron products, and "Trona" soda ash and sodium sulphate at Trona, on Seales Lake, Calif. **AMERICAN POTASH AND CHEMICAL CORP.**, New York, N. Y.

**The Labor Saver.** No. 174 features a story on the 2,000,000-ton stone storage and screening plant of Inland Lime and Stone Co. at Port Inland, Mich. No. 175 deals with the long belt conveyor installation at Victoria Gypsum Co., Ltd., Little Narrows, N. S., Canada; with the fine screening plant at Kelley Island Lime and Transport Co., White Rock, Ohio; and with other S-A installations. The booklets, 24 pages each, also illustrate box car loaders, vibrators, ball bearing idlers, variable speed reducers, stackers, feeders, etc. **STEPHENS-ADAMSON MANUFACTURING CO.**, Aurora, Ill.

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The Dorrc Sand Washer is a compact, self-contained unit. It is ideally adapted to installation on land, on dredges, or on portable sand plants.

Sand is washed mechanically by the revolving buckets and discharged after draining without loss of head. The bulk of the fine grain is recovered and not lost in the silt-laden overflow water.

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**SAND AND GRAVEL**  
Dorr Classifiers  
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Dorr Slurry Mixers  
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### FURNISHED IN THREE CONVENIENT SIZES

SIZE	CAPACITY
7 ft. dia.....	20-40 tons per hr.
9 ft. dia.....	40-80 tons per hr.
12 ft. dia.....	80-150 tons per hr.



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If so, you'll need all the strength and stamina, the uniform wear and handling ease that our pre-forming process puts into wire rope.

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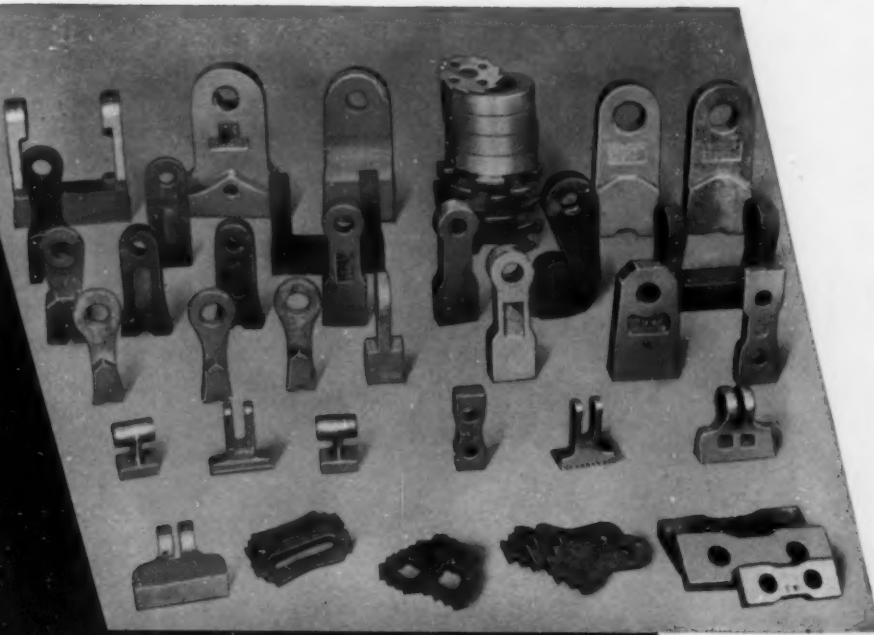
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MANGANESE STEEL WEARING PARTS  
*for pulverizers and hammermills*



Pump Parts; Cutter Heads; Dippers; Dipper Teeth; Buckets; Rack and Pinions; Jaw Plates; Check Plates; Mantles; Screen Cloth; Welding Rod; Grinding Balls, etc. Send for bulletins.

To insure lowest possible crushing costs, cement plants write "TISCO" in their specifications for wearing parts for hammermills and pulverizers. Experience has proved that the TISCO ingredients of *uniform manganese content, and rigid manufacturing and heat treating control*, provide sound, uniform castings which wear longer, and appreciably cut operating costs.

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**Nineteenth Annual Convention**

of the

**National Lime Association**

will be held at

**Where?**—at The Drake in Chicago

**When?**—on May 11 and 12, 1937

## **Who's Invited?**

All executives of lime manufacturing plants, their superintendents, operating men, salesmen, technical staff, and all others who may be interested.

**Why?** —because a real program of importance to the entire lime industry is being developed.

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Announcement of winners of 1936 Safety Competition . . . Report and discussion on M.I.T. mortar and concrete research . . . Talking film strip, "American Standards of Living," . . . Employer and employee relationship discussed by a man who knows what it's all about . . . "The Selling Process," what it involves and how to make it successful . . . Up-to-the-minute report on the legislative situation . . . The importance of lime in the battle against plant diseases and insects . . . A full session on operating problems . . . AND other subjects to be announced later.

## **Features**

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**Up to 8 Yards a  
Minute in Handling  
Crushed Stone**

The Haiss "135", without getting out of the price range of a loader-type machine, competes in capacity with BIG equipment. It fills the need of the quarryman, sand pit operator or contractor who wants to dispatch big trucks FAST. Like all Haiss high-powered Loaders it has a locomotive rather than a truck-type transmission, with heavy, broad faced gears to carry the power load of its 46 H.P. Gasoline motor or Waukesha-Hesselmann Oil Engine drive.

The "135" is built to meet all the strains its big capacity and high loading rate entail. It is the heaviest and strongest as well as the fastest Loader built.

The Haiss-patented long combination of worm-driven slow crowding speed working with a revolving paddle self-feeding device is available in its most efficient form on the "135" and other heavy duty Haiss Loaders.

Whatever your present truck loading equipment, you owe yourself a reading of the "135" Bulletin.

### 1937 Improvements Give Super-Strength to Hi-Power Bucket



We're proud of the 1937 Hi-Power line—and after 44 years of bucket building we know what it's all about. We'd like nothing better than to sell you a Haiss Hi-Power for a job that's been tough on the best bucket you've ever owned.

The Hi-Power's performance will make you a booster for Haiss. You'll tell others about your discovery—and our bucket business will grow.

Or, if you'd rather take someone else's word for it, we'd like to give you a list of recent purchasers. They'll be our best salesmen. Clip the coupon—and get acquainted with a REAL digging bucket.



**"I Want a Loader that will Stand Up," says this Man**

As with a lot of others, it's going to take first hand acquaintance with a HAISST Loader, to give him a real understanding of how many hundreds of thousands of yards a Loader should handle—and with how little upkeep. One cent a

yard for maintenance is a liberal allowance—and we're quoting the experience of many users who have kept records on Haiss machines through ten years and more of continuous service. A Haiss Loader of any age has the highest resale value of any machine of its class. Doesn't that tell the story? For low cost per yard handled, over a long lifetime, you can't beat a Haiss!

### GEORGE HAISST MANUFACTURING CO., INC.

Park Ave. & 143rd St., New York

Please send me your latest catalogs on the Loaders checked:

- Model 135—5 to 8 yds. per min.
- Model 80—3 to 5 yds. per min.
- Model 27—2 to 3 yds. per min.

Send me also your catalogs on:

- Hi-Power Clamshell Buckets for Excavating
- Haiss Portable Belt Conveyors

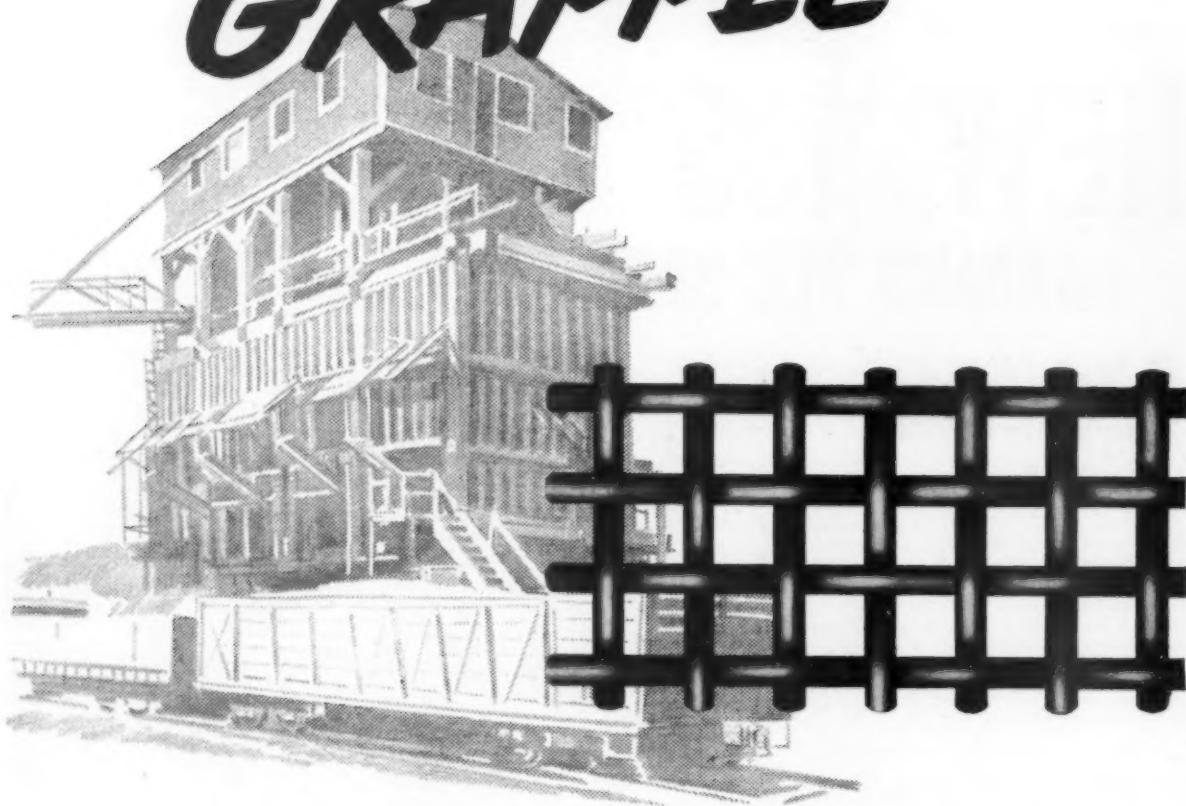
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City.....

**BUILT TO**

**GRAPPLE**



**...WITH TOUGH SERVICE!**

ONLY wire that is built to "take it" stands a chance in the gruelling tussle of screening operations.

Making wire has been Roebling's business for over 90 years. This long experience enables us to build into a screen the qualities of strength and resistance to vibration so necessary for long and efficient screen life.

Why not let this knowledge of wire screen making help in the solution of your screening problems? Whether for sizing, cleaning or grading, Roebling Wire Screens are available in types and metals for all needs.

**JOHN A. ROEBLING'S SONS COMPANY**  
TRENTON, N. J.

*Branches in Principal Cities*

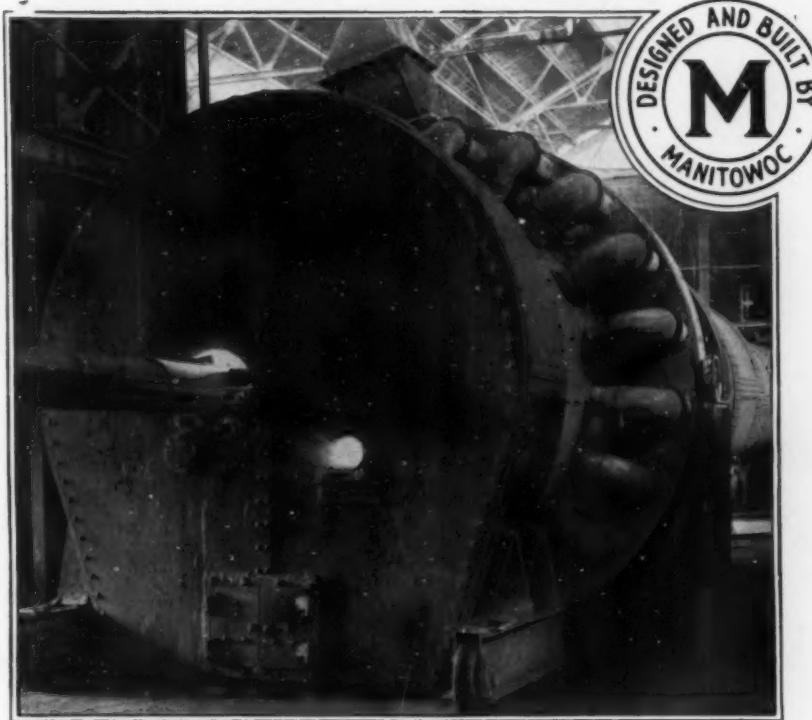
**ROEBLING** *Wire Screen*



**90 YEARS OF WIRE MAKING SPELLS THE DIFFERENCE**

# The Vanderwerp Recuperator

for Rotary Kilns



Correct in  
Principle

Proved in  
Practice

The VANDERWERP RECUPERATOR alone meets the full requirements of kiln operators:

## Because:

The maximum of heat recovery is obtained, since the heat exchange between clinker and combustion air takes place within the kiln, thoroughly insulated against radiation losses.

It has been demonstrated that the quality of the cement is greatly improved by rapidly air quenching the clinker at its maximum temperature. The beneficial effects thus obtained upon the structure of the clinker and upon the relationships between its various constituents are now generally recognized to be of very great importance.

*Write, without obligation, for full particulars*

## MANITOWOC ENGINEERING WORKS

*Division of*

Manitowoc Ship Building Company

GENERAL OFFICES AND PLANT

Manitowoc, Wisconsin

CHICAGO OFFICE

131 E. River St.



# Hundreds of Profitable Ideas in these Departments of Rock Products

Ideas on operating methods—short cuts and big time-savers other operators are using which could profitably be used by you.

Ideas in these departments enable you to keep in touch with the latest developments within the industry. A single idea may solve that perplexing problem—may give you that increased production—that lowering of operating cost you have been seeking—

## MAIL THIS COUPON TODAY

### ROCK PRODUCTS

205 W. Wacker Drive  
Chicago, Ill.

Here are my \$2. Send me ROCK PRODUCTS for a whole year and include a FREE copy of HINTS and HELPS—the BIG 8 1/2x11" book of time, labor and money saving ideas.

NAME .....

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MY TITLE (POSITION) IS .....

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Take advantage of our 2-year offer at \$3.00

that higher quality in your product or a method of increasing your sales. In addition, you will find in each issue of ROCK PRODUCTS a digest of foreign literature, technical articles, news briefs, financial news, editorial comments, plant stories, items dealing with new trends, traffic and transportation, the development, manufacture and sale of concrete products and other subjects so vital to the successful operation of your business.

## A Big \$2 Worth

To those sending in \$2.00 NOW for a year's subscription—12 BIG ISSUES OF ROCK PRODUCTS—we will send FREE OF CHARGE a copy of HINTS and HELPS for SUPERINTENDENTS. This is a book size 8 1/2x11 inches. Containing 96 pages in which approximately 300 cuts illustrate more than 260 of the most valuable ideas selected from among thousands submitted by operating men whose recommendations are based on actual experience.

ACT NOW before the supply of this valuable book is exhausted.

# LOW MAINTENANCE WITH G-E EQUIPMENT

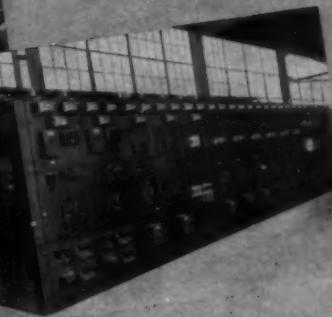
## Reports Volunteer Portland Cement Company



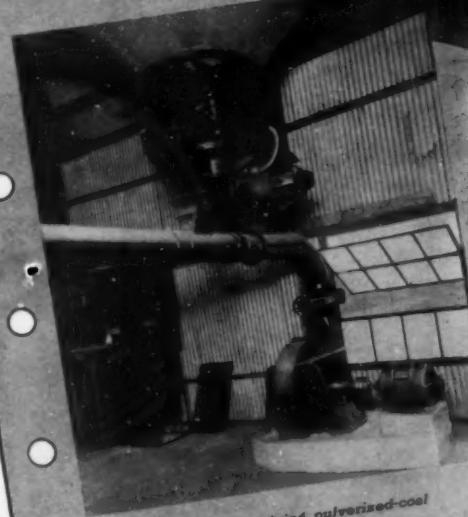
G-E transformers in outdoor substation.  
In ten years they have given "no trouble  
whatever."



Induction motors driving  
pumps in basement between  
raw and finish grinding mills



14-panel switchboard in  
mill room, power distribution  
center for entire plant



Type CD d-c motor driving pulverized-coal  
feed and induction motor driving fan

*Notes on trip through plant*

HERE is part of a letter from Mr. Charles F. Lewis, Manager, Volunteer Portland Cement Company, concerning the performance of G-E equipment in the plant near Knoxville, Tenn., where for ten years high-grade cement has been produced by the most modern, efficient methods.

"In reviewing our experience with this equipment through this period we find it has been very satisfactory, both for its performance and in your active interest in its performance. We have had no trouble whatever with our transformers; we have had to do nothing to the switchboard beyond occasionally dressing the main contacts of the oil switches and recalibrating instruments. Motor bearing trouble has been very light, and we have put new windings in only 4 motors.\* One of these motors we have rewound 2 or 3 times, but it has been running with overloads up to 80 or 100 per cent from the start."

Throughout the rock-products industry, G-E equipment is noted for its low maintenance. Call the nearest G-E representative for further information. General Electric, Schenectady, N. Y.

\*There are about one hundred G-E motors in this plant.

011-170

**GENERAL**  **ELECTRIC**

# HOW TO HANDLE **IT** IF IT IS SAND, GRAVEL, STONE



## REX-STEARN'S TIMKEN IDLERS MEAN LOW-COST CONVEYING

● The two toughest problems for conveyors in the sand, gravel and stone industry are dust protection and repair costs. Both are met and solved when Rex-Stearns Timken Idlers are installed. Their positive grease seal keeps all of the abrasive and corrosive fines away from the bearings. Grease is held on the inside where it belongs.

**DUST STAYS OUT—GREASE STAYS IN**—means that Rex-Stearns Timken Idlers have longer life and an upkeep cost that is practically nothing. Once installed, they need only an occasional shot of grease to keep them running smoothly for years of trouble-free, low-cost operation.

CHAIN BELT COMPANY, 1649 W. Bruce St., Milwaukee, Wis.

This new book, "How To Handle It With Rex Belt Conveyors," contains complete and specialized information on the design and application of belt conveyors. Send for your copy today! Ask for Catalog No. 270.



**CHAIN BELT COMPANY  
of MILWAUKEE**  
*Chain and Belt Conveying*

# WE BET ON A SURE THING "Stabilized Aggregates"

**FOLEY & BEARDSLEE**

Washed Sand and Gravel  
CLARKSTON, MICH.

Calcium Chloride Association  
4145 Penobscot Building  
Detroit, Michigan

February 3, 1937

Gentlemen:

We thought we were gambling when we installed a plant for the production of calcium-chloride-stabilized aggregates, in the spring of 1936. But we soon found out that we had bet on a "sure thing."

Before the year ended, we had our equipment investment back and showed a mighty substantial and gratifying profit besides.

Are we going to be in the plant-mixed stabilized aggregates business again this year? Try to keep us out of it!

Very truly yours,

**FOLEY & BEARDSLEE**

*Thos. J. Foley.*  
Thos. J. Foley,  
President



Stabilized Aggregates Plant of Foley & Beardslee, Clarkston, Michigan.

Expand your aggregates business as others have done. The increased demand for stable soil mixtures of aggregates, sand, clay and Calcium Chloride will take the capacity of many new mixing plants in 1937. You already have much of the needed equipment. You can utilize much material otherwise not saleable. Will you take advantage of this big, new aggregates market? Write for literature that tells how.

#### CALCIUM CHLORIDE ASSOCIATION

The Columbia Alkali Corporation . . . Barberton, Ohio  
The Dow Chemical Company . . . Midland, Michigan  
Michigan Alkali Co. . . . 60 E. 42nd St., New York City  
Solvay Sales Corp. . . . 40 Rector St., New York City

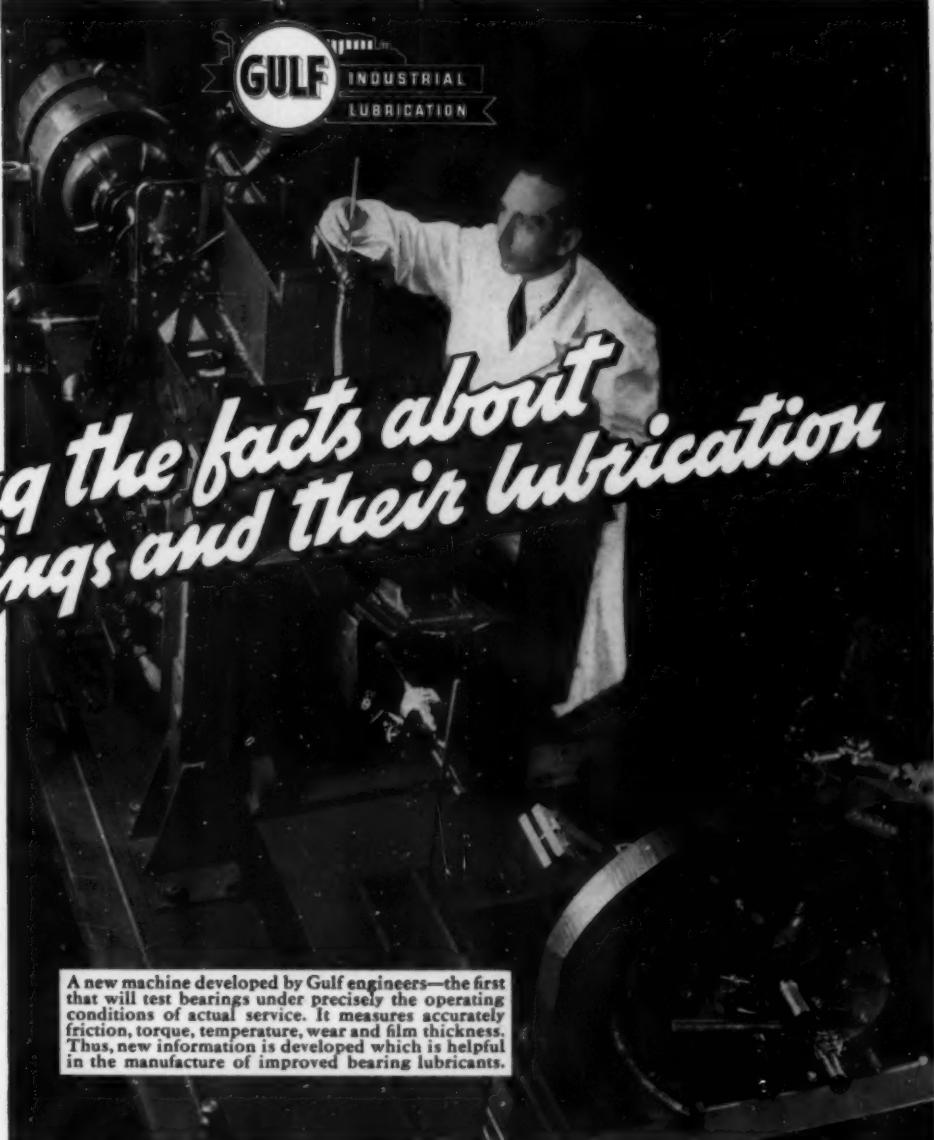
# CALCIUM CHLORIDE

FOR STABILIZING ROAD SURFACES

# Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 2

Aggregate Admixture	Jeffrey Mfg. Co.
Calcium Chloride Ass'n	Pioneer Gravel Equipment
Aggregate De-dusters	Mfg. Co.
Western Precipitation Co.	
Agitators, Thickeners and Slurry Mixers	Bin Gates
The Dorr Co.	Allen-Sherman-Hoff Co.
Hardinge Co., Inc.	Chain Belt Co.
Manitowoc Engineering Wks.	Fuller Co.
F. L. Smith & Co.	Industrial Brownhoist Corp.
Airveyor	Kennedy-Van Saun Mfg. & Engr. Corp.
Fuller Co.	Link-Belt Co.
Air Compressors	Sprout, Waldron & Co., Inc.
Fuller Co.	Traylor Engr. & Mfg. Co.
Gardner-Denver Co.	Bins, Hoppers
Nordberg Mfg. Co.	Besser Mfg. Co.
F. L. Smith & Co.	Blaw-Knox Co.
Sterling Machinery Corp.	Traylor Engr. & Mfg. Co.
Traylor Engr. & Mfg. Co.	Bins, Storage (Steel)
Worthington Pump & Machy. Co.	Besser Mfg. Co.
Air Filters	Kennedy-Van Saun Mfg. & Engr. Corp.
Air-Maze Corporation	Blasting Cap Protectors
Fuller Co.	B. F. Goodrich Co.
Air Filter Frames	Blasting Machines
Air-Maze Corporation	Atlas Powder Co.
Fuller Co.	E. I. du Pont de Nemours & Co., Inc.
Air Separators	Hercules Powder Co.
Bradley Pulverizer Co.	Blasting Supplies
Hardinge Co., Inc.	Atlas Powder Co.
Raymond Bros. Impact Pulv. Co.	E. I. du Pont de Nemours & Co., Inc.
Sturtevant Mill Co.	Hercules Powder Co.
Williams Patent Crusher & Pulv. Co.	Block Machines, Building
Western Precipitation Co.	Besser Mfg. Co.
Applicator Bars	Miles Mfg. Co.
Stulz-Sickles Co.	Multiplex Concrete Machy. Co.
Babbitt Metal	Stearns Mfg. Co.
Joseph T. Ryerson & Son, Inc.	Block Machines, Silo
Backfillers	Besser Mfg. Co.
Bucyrus-Erie Co.	Blocks (Pillow, Roller Bearing)
Harnischfeger Corp.	Link-Belt Co.
Lima Locomotive Works Inc. (Ohio Power Shovel Co.)	Standard Pressed Steel Co.
Balls, Grinding, (See Grinding Balls)	Timken Roller Bearing Co.
Balls (Tube Mill, etc.)	Blocks (Sheave)
Allis-Chalmers Mfg. Co.	American Manganese Steel Co.
Carnegie-Illinois Steel Corp.	Bodies (Car & Motor Truck)
Hardinge Co., Inc.	Easton Car & Construction Co.
Kennedy-Van Saun Mfg. & Engr. Corp.	The Hug Company
F. L. Smith & Co.	Boilers
Bar Sanders and Cutters	Babcock & Wilcox Co.
Koehring Co.	Birdsboro Steel Fdry. & Mach. Co.
Batchers, Measuring Volume	Cards (Dump)
Besser Mfg. Co.	Carnegie-Illinois Steel Corp.
Fuller Company	Cars and Track, Industrial
Bearings	Besser Mfg. Co.
Chains Belt Co.	Chase Fdry. & Mfg. Co.
Link-Belt Co.	Cars (Quarry & Gravel Pit)
Joseph T. Ryerson & Son, Inc.	Carnegie-Illinois Steel Co.
Standard Pressed Steel Co.	Easton Car & Construction Co.
Timken Roller Bearing Co.	Castings
Bearings (Anti-Friction)	Babcock & Wilcox Co.
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Timken Roller Bearing Co.	Cars (Dump)
Bearings (Roller)	Carnegie-Illinois Steel Corp.
Timken Roller Bearing Co.	Cars and Track, Industrial
Bearings (Tapered Roller)	Besser Mfg. Co.
Timken Roller Bearing Co.	Chase Fdry. & Mfg. Co.
Bearings (Thrust)	Cars (Quarry & Gravel Pit)
Timken Roller Bearing Co.	Carnegie-Illinois Steel Co.
Belt Fasteners	Easton Car & Construction Co.
Flexible Steel Lacing Co.	Casting
Beltting	Babcock & Wilcox Co.
L. H. Gilmer Co.	Birdsboro Steel Fdry. & Mach. Co.
Robins Conveying Belt Co.	Cards (Dump)
Thermold Rubber Co.	Carnegie-Illinois Steel Corp.
Belt Lacing (Steel)	Cars and Track, Industrial
Flexible Steel Lacing Co.	Besser Mfg. Co.
Beltting (Elevator and Conveyor)	Chase Fdry. & Mfg. Co.
B. F. Goodrich Co.	Cars (Quarry & Gravel Pit)
Goodyear Tire & Rubber Co.	Carnegie-Illinois Steel Co.
Thermold Rubber Co.	Easton Car & Construction Co.
Beltting (Transmission)	Casting
L. H. Gilmer Co.	Babcock & Wilcox Co.
B. F. Goodrich Co.	Birdsboro Steel Fdry. & Mach. Co.
Goodyear Tire & Rubber Co.	Cards (Dump)
Thermold Rubber Co.	Carnegie-Illinois Steel Corp.
Beltting (V. Type)	Cars and Track, Industrial
L. H. Gilmer Co.	Besser Mfg. Co.
B. F. Goodrich Co.	Chase Fdry. & Mfg. Co.
Goodyear Tire & Rubber Co.	Cars (Quarry & Gravel Pit)
Thermold Rubber Co.	Carnegie-Illinois Steel Co.
Bins (Steel)	Easton Car & Construction Co.
Pioneer Gravel Equipment	Casting
Mfg. Co.	Babcock & Wilcox Co.
Bin Gates	Birdsboro Steel Fdry. & Mach. Co.
Allen-Sherman-Hoff Co.	Cards (Dump)
Chain Belt Co.	Carnegie-Illinois Steel Corp.
Fuller Co.	Cars and Track, Industrial
Industrial Brownhoist Corp.	Besser Mfg. Co.
Kennedy-Van Saun Mfg. & Engr. Corp.	Chase Fdry. & Mfg. Co.
Link-Belt Co.	Cars (Quarry & Gravel Pit)
Sprout, Waldron & Co., Inc.	Carnegie-Illinois Steel Co.
Traylor Engr. & Mfg. Co.	Easton Car & Construction Co.
Worthington Pump & Machy. Co.	Casting
Cables	Babcock & Wilcox Co.
Broderick & Bascom Rope Co.	Birdsboro Steel Fdry. & Mach. Co.
Williamsport Wire Rope Co.	Cards (Dump)
Coal Crushers and Rolls	Carnegie-Illinois Steel Corp.
Williams Patent Crusher & Pulv. Co.	Cars and Track, Industrial
Coal Pulverizing Equipment	Besser Mfg. Co.
Babcock & Wilcox Co.	Chase Fdry. & Mfg. Co.
Bonnot Company	Cars (Quarry & Gravel Pit)
Bradley Pulverizer Co.	Carnegie-Illinois Steel Co.
Gruendler Crusher & Pulv. Co.	Easton Car & Construction Co.
Hardinge Company, Inc.	Casting
Kennedy-Van Saun Mfg. & Engr. Corp.	Babcock & Wilcox Co.
Link-Belt Co.	Birdsboro Steel Fdry. & Mach. Co.
Clay Working Machinery	Cards (Dump)
Bonnot Company	Carnegie-Illinois Steel Corp.
Clips (Wire Rope)	Cars and Track, Industrial
Broderick & Bascom Rope Co.	Besser Mfg. Co.
Williamsport Wire Rope Co.	Chase Fdry. & Mfg. Co.
Coal Crushers and Rolls	Cars (Quarry & Gravel Pit)
Williams Patent Crusher & Pulv. Co.	Carnegie-Illinois Steel Co.
Coal Pulverizing Equipment	Easton Car & Construction Co.
Babcock & Wilcox Co.	Casting
Bonnot Company	Babcock & Wilcox Co.
Bradley Pulverizer Co.	Birdsboro Steel Fdry. & Mach. Co.
Gruendler Crusher & Pulv. Co.	Cards (Dump)
Hardinge Company, Inc.	Carnegie-Illinois Steel Corp.
Kennedy-Van Saun Mfg. & Engr. Corp.	Cars and Track, Industrial
Link-Belt Co.	Besser Mfg. Co.
Cables (Shafting)	Chase Fdry. & Mfg. Co.
Standard Pressed Steel Co.	Cars (Quarry & Gravel Pit)
Colors, Cement	Carnegie-Illinois Steel Co.
Geo. S. Mepham Corp.	Easton Car & Construction Co.
Tamms Silica Co.	Casting
Compressors (See Air Compressors)	Babcock & Wilcox Co.
Concrete Pipe Machinery	Birdsboro Steel Fdry. & Mach. Co.
Quinn Wire & Iron Works	Cards (Dump)
Universal Concrete Pipe Co.	Carnegie-Illinois Steel Corp.
Concrete Slab Raising Equipment (Mud-Jack)	Easton Car & Construction Co.
Koehring Co.	Casting
Conveyor Belting (See Belting)	Babcock & Wilcox Co.
Conveyor Idlers and Rolls	Birdsboro Steel Fdry. & Mach. Co.
Barber-Greene Company	Cards (Dump)
C. O. Bartlett & Snow Co.	Carnegie-Illinois Steel Corp.
Chain Belt Co.	Easton Car & Construction Co.
Jeffrey Mfg. Co.	Casting
Link-Belt Co.	Babcock & Wilcox Co.
Conveyors and Elevators	Birdsboro Steel Fdry. & Mach. Co.
Allen Sherman Hoff Co.	Cards (Dump)
Earl C. Bacon	Carnegie-Illinois Steel Corp.
Barber-Greene Company	Easton Car & Construction Co.
Besser Mfg. Co.	Casting
Chain Belt Co.	Babcock & Wilcox Co.
Fuller Company	Birdsboro Steel Fdry. & Mach. Co.
Huron Industries, Inc.	Cards (Dump)
Industrial Brownhoist Corp.	Carnegie-Illinois Steel Corp.
Jeffrey Mfg. Co. (Vibrating)	Easton Car & Construction Co.
Kennedy-Van Saun Mfg. & Engr. Corp.	Casting
Link-Belt Co.	Babcock & Wilcox Co.
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Jeffrey Mfg. Co. (Vibrating)	Easton Car & Construction Co.
Kennedy-Van Saun Mfg. & Engr. Corp.	Casting
Link-Belt Co.	Babcock & Wilcox Co.
Conveyors and Elevators	Birdsboro Steel Fdry. & Mach. Co.
Allen Sherman Hoff Co.	Cards (Dump)
Earl C. Bacon	Carnegie-Illinois Steel Corp.
Barber-Greene Company	Easton Car & Construction Co.
Besser Mfg. Co.	Casting
Chain Belt Co.	Babcock & Wilcox Co.
Fuller Company	Birdsboro Steel Fdry. & Mach. Co.
Huron Industries, Inc.	Cards (Dump)
Industrial Brownhoist Corp.	Carnegie-Illinois Steel Corp.
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Earl C. Bacon	Carnegie-Illinois Steel Corp.
Barber-Greene Company	Easton Car & Construction Co.
Besser Mfg. Co.	Casting



# Proving the facts about bearings and their lubrication

A new machine developed by Gulf engineers—the first that will test bearings under precisely the operating conditions of actual service. It measures accurately friction, torque, temperature, wear and film thickness. Thus, new information is developed which is helpful in the manufacture of improved bearing lubricants.

## GULF ENGINEERS Seek . . . and FIND . . . the Answers to many questions regarding bearing lubrication

**WHAT** is the practical relation of viscosity to shaft speed, bearing load and various bearing metals?

**WHY** are some bearings *easy* to lubricate while others of similar construction and in similar service are *difficult* to lubricate?

**HOW** can present lubricants be improved to anticipate future progress in bearing design and application?

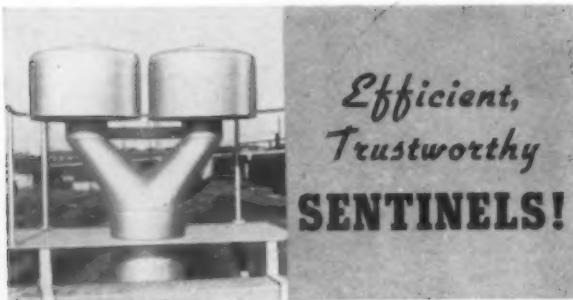
These and many other problems regarding bearing performance are being studied every day by

Gulf scientists in the most modern petroleum research laboratory in the world.

These laboratory findings—supplemented by 37 years of practical experience—are being converted into operating benefits for industry. The result—to users of Gulf quality lubricants—is lower costs for maintenance and lubrication.

**GULF OIL CORPORATION  
GULF REFINING COMPANY**

GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.



These two large Air-Maze Air Filters are on duty day and night, high atop the locomotive shop of a principal mid-western railroad. There, they constantly guard against the entrance of even the finest dust into the huge air compressor which serves the shop. These "sentinels" draw no salary or expenses; instead, they pay dividends in the form of substantial savings by preventing premature overhaul expense and trouble.

Previously, valve failures and other troubles were occurring every 30 days or less. Now, since the installation of Air-Maze—these unnecessary difficulties have been eliminated. Air-Maze offers similar protection to all air-using equipment used in quarries and pits. Air-Maze traps the fine grit and other hard-to-filter matter that attends crushing and screening operations.

Be Safe—insist on Air-Maze protection!

## These Air-Maze Features Assure Complete Protection

- ✓ Highest air filtering efficiency (99% plus).
- ✓ Extremely low pressure drop.
- ✓ Will not clog.
- ✓ Easily serviced.
- ✓ Large element area permits low air velocity so essential to perfect air filtration.

A type and size for every application.

Let Air-Maze show you the way to economical, trouble-free equipment performance. Write for bulletins CR-16 and R3-25.



Oil Bath Type

**AIR-MAZE CORPORATION**  
816 HURON RD. CLEVELAND, OHIO

**AIR-MAZE**  
INDUSTRIAL AIR FILTERS

## Classified Directory—Continued

**Cranes (Clamshell)**  
Harnischfeger Corp.  
Koehring Co.  
Manitowoc Engineering Wks.  
**Cranes (Crawler and Locomotive)**  
Bucyrus-Monighan Co.  
Harnischfeger Corp.  
Industrial Brownhoist Corp.  
Koehring Co.  
Lima Locomotive Works Inc.  
(Ohio Power Shovel Co.)  
Link-Belt Co.  
Manitowoc Engineering Wks.  
Michigan Power Shovel Co.  
Northwest Engineering Co.  
**Cranes (Electric, Gasoline and Steam)**  
Theew Shovel Co.  
**Cranes (Excavator)**  
Koehring Co.  
**Cranes (Overhead Traveling Electric)**  
Harnischfeger Corp.  
Industrial Brownhoist Corp.  
**Crusher Parts**  
American Manganese Steel Co.  
American Pulverizer Co.  
Birdsboro Steel Fdry. & Mach. Co.  
C. G. Buchanan Co., Inc.  
Kennedy-Van Saun Mfg. & Engr. Corp.  
Pennsylvania Crusher Co.  
Taylor-Wharton Iron & Steel Co.  
**Crushers (Hammer)**  
The C. O. Bartlett & Snow Co.  
Carnegie-Illinois Steel Corp.  
Dixie Machy. Mfg. Co.  
Gruendler Crusher & Pulv. Co.  
Jeffrey Mfg. Co.  
Pennsylvania Crusher Co.  
Sturtevant Mill Co.  
Williams Patent Crusher & Pulv. Co.  
**Crushers (Jaw and Gyratory)**  
Allis-Chalmers Mfg. Co.  
Earle C. Bacon, Inc.  
Birdsboro Steel Foundry & Mach. Co.  
C. G. Buchanan Co., Inc.  
Good Roads Machinery Corp.  
Gruendler Crusher & Pulv. Co.  
Jeffrey Mfg. Co.  
Lewistown Fdy. & Mach. Co.  
(Jaw)  
New Holland Machine Co.  
Nordberg Mfg. Co.  
Pennsylvania Crusher Co.  
Pioneer Gravel Equipment Mfg. Co.  
Smith Engineering Works  
Traylor Engr. & Mfg. Co.  
Williams Patent Crusher & Pulv. Co.  
**Crushers (Reduction)**  
Earle C. Bacon, Inc.  
Birdsboro Steel Fdry. & Mach. Co.  
Bonnot Company  
C. G. Buchanan Co., Inc.  
Jeffrey Mfg. Co.  
**Crushers (Ring)**  
American Pulverizer Co.  
**Crushers (Roll)**  
American Pulverizer Co.  
Gruendler Crusher & Pulv. Co.  
New Holland Machine Co.  
Pioneer Gravel Equipment Mfg. Co.  
Williams Patent Crusher & Pulv. Co.  
**Crushers (Rotary)**  
American Pulverizer Co.  
J. B. Ehram & Sons Mfg. Co.  
**Crushers (Single Roll)**  
American Pulverizer Co.  
Gruendler Crusher & Pulv. Co.  
Jeffrey Mfg. Co.  
Link-Belt Co.  
McLanahan & Stone Corp.  
New Holland Machine Co.  
Pennsylvania Crusher Co.  
**Crushing Rolls**  
Allis-Chalmers Mfg. Co.  
Babcock & Wilcox Co.  
Birdsboro Steel Foundry & Mach. Co.  
C. G. Buchanan Co., Inc.  
Jeffrey Mfg. Co.  
New Holland Machine Co.  
Sturtevant Mill Co.  
Traylor Engr. & Mfg. Co.  
**Dedusters**  
Blaw-Knox Co.  
Derricks and Derrick Fittings  
Harnischfeger Corp.  
**Detonators**  
Atlas Powder Co.  
E. I. du Pont de Nemours & Co., Inc.  
Hercules Powder Co.  
**Diaphragms (Pump)**  
B. F. Goodrich Co.  
**Dippers and Teeth (Steam Shovel)**  
American Manganese Steel Co.  
Bucyrus-Monighan Co.  
The Frog Switch & Mfg. Co.  
Taylor-Wharton Iron & Steel Co.  
Theew Shovel Co.  
**Dirt Moving Equip. (Dumptor)**  
Koehring Co.  
**Ditchers**  
Barber-Greene Company  
Bucyrus-Monighan Co.  
Harnischfeger Corp.  
**Draglines**  
Bucyrus-Monighan Co.  
Harnischfeger Corp.  
Link-Belt Co.  
Manitowoc Engineering Wks.  
Northwest Engineering Co.  
Page Engineering Co.  
Theew Shovel Co.  
**Draglines (Gasoline or Electric)**  
Koehring Co.  
Manitowoc Engineering Wks.  
**Dragline Cableway Excavators**  
Bucyrus-Monighan Co.  
Link-Belt Co.  
Sauerma Bros., Inc.  
**Dragline Excavators**  
Bucyrus-Monighan Co.  
Lima Locomotive Works Inc.  
(Ohio Power Shovel Co.)  
Michigan Power Shovel Co.  
Northwest Engineering Co.  
Page Engineering Co.  
Theew Shovel Co.  
**Dredge Pumps (See Pumps, Dredging)**  
**Dredges**  
Bucyrus-Monighan Co.  
Hayward Co.  
Hetherington & Berner, Inc.  
(Complete Steel)  
Morris Machine Works  
**Dredging Sleeves**  
B. F. Goodrich Co.  
Thermoid Rubber Co.  
**Drill Bits**  
Timken Roller Bearing Co.  
**Drilling Accessories**  
Cleveland Rock Drill Co.  
Gardner-Denver Co.  
**Drill Sharpening Machines**  
Gardner-Denver Co.  
**Drill Steel**  
Cleveland Rock Drill Co.  
Gardner-Denver Co.  
Worthington Pump & Machy. Co.  
**Drills**  
Bucyrus-Monighan Co.  
Timken Roller Bearing Co.  
**Drills, Hammer (See Hammer Drills)**  
**Drills (Rock)**  
Cleveland Rock Drill Co.  
Gardner-Denver Co.  
Worthington Pump & Machy. Co.  
**Drills (Tripod)**  
Cleveland Rock Drill Co.  
**Drills (Wagon)**  
Cleveland Rock Drill Co.  
**Drives (Short Center)**  
Allis-Chalmers Mfg. Co.  
Earle C. Bacon, Inc.  
**Dryers**  
Allis-Chalmers Mfg. Co.  
Babcock & Wilcox Co.  
Bonnot Company  
Combustion Engineering Corp.  
Hardinge Company, Inc.  
Kennedy-Van Saun Mfg. & Engr. Corp.  
Manitowoc Engineering Wks.  
Traylor Engr. & Mfg. Co.  
**Dumptors**  
Koehring Co.  
**Dust Arresters**  
Western Precipitation Co.  
**Dust Collecting Systems**  
Allen Sherman Hoff Co.  
Allis-Chalmers Mfg. Co.  
The C. O. Bartlett & Snow Co.  
Blaw-Knox Co.  
**Dust Conveying Systems**  
Allen Sherman Hoff Co.  
Fuller Company  
Western Precipitation Co.

**Dynamite**  
 Atlas Powder Co.  
 E. I. du Pont de Nemours & Co., Inc.  
 Hercules Powder Co.

**Electric Cables and Wires**  
 John A. Roebling's Sons Co.

**Electric Mine Hoists**  
 Nordberg Mfg. Co.

**Electric Power Equipment**  
 Allis-Chalmers Mfg. Co.  
 General Electric Co.

**Emery Mills**  
 Sturtevant Mill Co.

**Engineers**  
 Bonnot Company  
 The Dorr Co.  
 Fuller Co.  
 Hetherington & Berner, Inc.  
 Kennedy-Van Saun Mfg. & Engr. Corp.  
 Productive Equipment Corp.  
 Robins Conveying Belt Co.  
 F. L. Smith & Co.  
 Sturtevant Mill Co.  
 Williams Patent Crusher & Pulv. Co.

**Engines (Diesel)**  
 National Supply Co.  
 Nordberg Mfg. Co.  
 Worthington Pump & Machy. Co.

**Excavating Machinery (See Shovels, Cranes, Buckets, etc.)**

**Excavators (Crawling Tractor)**  
 Koehring Co.

**Excavators (Dragline)**  
 Koehring Co.

**Explosives**  
 Atlas Powder Co.  
 E. I. du Pont de Nemours & Co., Inc.  
 Hercules Powder Co.

**Fans**  
 General Electric Co.

**Feeders**  
 Babcock & Wilcox Co. (Pulverized Coal)  
 Barie C. Bacon, Inc.  
 Besser Mfg. Co.  
 Chain Belt Co.  
 Fuller Co. (Cement and Pulverized Material)  
 Good Roads Machinery Corp.  
 Hardinge Company, Inc. (Weighing)  
 Kennedy-Van Saun Mfg. & Engr. Corp.  
 Pioneer Gravel Equipment Mfg. Co.  
 Jeffrey Mfg. Co. (Pan & Tube)  
 Robins Conveying Belt Co.  
 Schaffer Poldometer Co. (Weighing)  
 Smith Engineering Works (Plate)  
 Stearns Mfg. Co.

**Flame Arresters**  
 Air-Maze Corporation

**Flights**  
 Cross Eng. Co.

**Forgings**  
 Taylor-Wharton Iron & Steel Co.

**Frogs and Switches**  
 Taylor-Wharton Iron & Steel Co.

**Furnaces**  
 Combustion Engineering Corp.

**Fuses (Detonating and Safety)**  
 Ensign-Bickford Co.

**Fuses (Electrical)**  
 General Electric Co.

**Gaskets**  
 B. F. Goodrich Co.  
 Goodyear Tire & Rubber Co.

**Gasoline**  
 Socony-Vacuum Oil Co. Inc.  
 Texas Company

**Gears (Spur, Helical and Worm)**  
 Jeffrey Mfg. Co.  
 Taylor-Wharton Iron & Steel Co.

**Gears and Pinions**  
 Chain Belt Co.  
 General Electric Co.  
 Link-Belt Co.  
 Taylor-Wharton Iron & Steel Co.

**Gelatin and Semi-Gelatin (See Explosives)**

**Grapples**  
 Blaw Knox Co.  
 Hayward Co.  
 Owen Bucket Co.

**Grease**  
 Gulf Refining Co.  
 Socony-Vacuum Oil Co. Inc.  
 Texas Company

**Grinding Balls**  
 Babcock & Wilcox Co.  
 Carnegie-Illinois Steel Corp.  
 Jeffrey Mfg. Co.  
 Kennedy-Van Saun Mfg. & Engr. Corp.

**Grizzlies**  
 American Manganese Steel Co.  
 Jeffrey Mfg. Co. (Vibrating)  
 Kennedy-Van Saun Mfg. & Engr. Corp.  
 Productive Equipment Corp.  
 Robins Conveying Belt Co.  
 Smith Engineering Works  
 Taylor Engr. & Mfg. Co.

**Grizzly Feeders**  
 Jeffrey Mfg. Co.  
 Taylor Engr. & Mfg. Co.

**Hammer Drills**  
 Cleveland Rock Drill Co.  
 Gardner-Denver Co.  
 Worthington Pump & Machy. Co.

**Hammer Mills (See Crushers)**

**Heater, Bitumen**  
 Easton Car & Construction Co.

**Hoists**  
 Gardner-Denver Co.  
 Harnischfeger Corp.  
 Ingersoll-Rand Co.  
 Link-Belt Co.  
 Northwest Engineering Co.  
 Pioneer Gravel Equipment Mfg. Co.  
 Sterling Machinery Corp.

**Hose (Water, Steam, Air Drill, Pneumatic, Sand Suction and Discharge)**  
 Cleveland Rock Drill Co.  
 B. F. Goodrich Co.  
 Goodyear Tire & Rubber Co.  
 Thermoid Rubber Co.  
 Worthington Pump & Machy. Co.

**Hose Couplings (See Couplings —Hose, Pipe, etc.)**

**Hydrators**  
 Blaw-Knox Co.

**Insulation (Electric)**  
 General Electric Co.

**Kilns (Shaft)**  
 Hardinge Company, Inc.

**Kilns and Coolers (Rotary)**  
 Allis-Chalmers Mfg. Co.  
 Blaw-Knox Co.  
 Bonnot Company  
 Chicago Bridge & Iron Co.  
 Hardinge Co., Inc.  
 Kennedy-Van Saun Mfg. & Engr. Corp.  
 Manitowoc Engineering Wks.  
 F. L. Smith & Co.  
 Taylor Engr. & Mfg. Co.

**Kominuters (See Mills)**

**Laboratory Crushers**  
 Sturtevant Mill Co.  
 Williams Patent Crusher & Pulv. Co.

**Lamp Guards**  
 Flexible Steel Lacing Co.

**Lighters, Hot Wire (For Safety Fuse)**  
 Ensign-Bickford Co.

**Lime Handling Equipment**  
 Fuller Company  
 Hardinge Co., Inc.  
 Link-Belt Co.  
 Raymond Bros. Impact Pulv. Co.

**Lime Kilns (See Kilns and Coolers, Rotary)**

**Linings (Iron for Ball and Tube Mills) (See Mill Liners)**

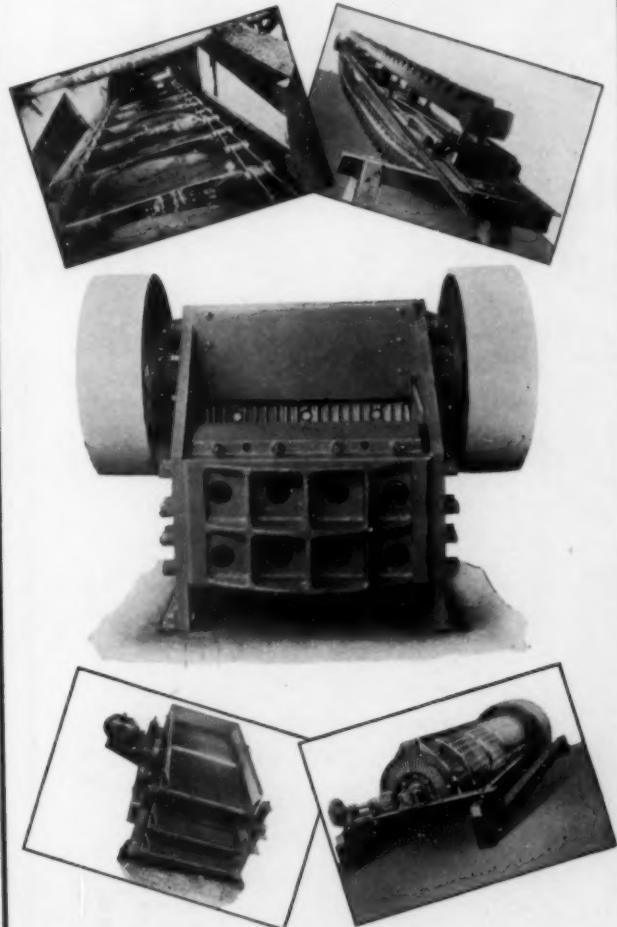
**Linings (Rubber for Chutes, Ball and Tube Mills, Tank and Pipe)**  
 B. F. Goodrich Co.

**Loaders and Unloaders**  
 Barber-Greene Company  
 Bucyrus-Monighan Co.  
 Fuller Company  
 Gen. Hause Mfg. Co., Inc.  
 Jeffrey Mfg. Co.  
 Link-Belt Co.  
 Northwest Engineering Co.  
 Robins Conveying Belt

**Loaders (Underground)**  
 Thew Shovel Co.



## Crushing Plant Equipment



Top left—Champion Mechanical Conveyor Type Wash Box.

Top right—Champion Steel Frame Bucket Elevator.

Bottom left—Champion Triple Deck Vibrating Screen.

Bottom right—Champion Gear Driven Revolving Screen.

Center—Champion Roller Bearing No. 1040 Rock Crusher.

Complete Plants and Equipment. Write for information.

**GOOD ROADS MACHINERY CORP.**  
 KENNEDY SQUARE, PA.



## Reduction Crushers Require LESS POWER

Actual operating records over a long period of time have produced a record for low cost operating that deserves your careful consideration. Lower costs are due to rugged construction, fewer parts and even distribution of wear.

Power savings of 50% or more, as shown by field tests—producing 30 tons per hour of 1" minus material with less than 10 HP.

The BONNOT is not a roll crusher and has no troublesome gears, countershaft or eccentric sleeves. The slow creep mantle is a real advance in crusher design to distribute wear evenly.

Write for Bulletin No. 150

**THE BONNOT CO.**  
CANTON, OHIO

Since 1891

NEW YORK OFFICE: 30 CHURCH STREET

## Classified Directory—Continued

- Locomotive Cranes (See Cranes, Crawler and Locomotive)**
- Locomotives (Gas-Electric)** Jeffrey Mfg. Co.
- Locomotives (Geared)** Lima Locomotive Works, Inc.
- Locomotives (Storage Battery)** General Electric Co.
- Locomotives (Steam, Gas and Electric)** General Electric Co.
- Lima Locomotive Works, Inc.**
- Log Washer** McLanahan & Stone Corp.
- Smith Engineering Works**
- Lubricants** Gulf Refining
- Socony-Vacuum Oil Co. Inc.
- Texas Company
- Lubricants (Wire Rope)** Broderick & Bascom Rope Co.
- Machinery Guards** Harrington & King Perf. Co.
- Magnets** General Electric Co.
- Magnetic Pulleys** Birdsboro Steel Foundry & Mach. Co.
- C. G. Buchanan Co., Inc.
- Manganese Steel (Plates and Sheets)** Manganese Steel Forge Co., Inc.
- Manganese Steel Castings** American Manganese Steel Co.
- The Frog, Switch & Mfg. Co.
- Taylor-Wharton Iron & Steel Co.
- Manganese Steel Parts** American Manganese Steel Co.
- Manganese Steel Forge Co., Inc.
- Taylor-Wharton Iron & Steel Co.
- Material Handling Equipment** Jeffrey Mfg. Co.
- Mechanical Rubber Goods** B. F. Goodrich
- Thermoid Rubber Co.
- Mill Liners and Linings (Iron for Ball and Tube Mills)** Babcock & Wilcox Co.
- Carnegie-Illinois Steel Corp.
- Hardinge Company, Inc.
- Jeffrey Mfg. Co.
- Kennedy-Van Saun Mfg. & Engr. Corp.
- F. L. Smith & Co.
- Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)** Allis-Chalmers Mfg. Co.
- American Pulverizer Co.
- Bonnot Company
- Bradley Pulverizer Co.
- Gruendler Crusher & Pulv. Co.
- Hardinge Co., Inc.
- Kennedy-Van Saun Mfg. & Engr. Corp.
- Raymond Bros. Impact Pulv. Co.
- F. L. Smith & Co.
- Traylor Engr. & Mfg. Co.
- Williams Patent Crusher & Pulv. Co.
- Mine Handling Equipment** Chain Belt Co.
- Mixers (Commercial Concrete)** Jaeger Machine Co.
- Mixers (Concrete)** Besser Mfg. Co.
- Gruendler Crusher & Pulv. Co.
- Jaeger Machine Co.
- Koenring Co.
- Multiplex Concrete Machy. Co.
- Mortar Colors** Geo. S. Mepham Corp.
- Tamms Silica Co.
- Motors and Generators (Electric Units)** Allis-Chalmers Mfg. Co.
- General Electric Co.
- Harnischfeger Corp.
- Motor Trucks** The Hug Company
- Nitramon** E. I. du Pont de Nemours & Co., Inc.
- Nozzles (Gravel Washing)** Chain Belt Co.
- Nuts (Lock)** Standard Pressed Steel Co.
- Oil Burners** Babcock & Wilcox Co.
- F. L. Smith & Co.
- Oilers (Air Line)** Gardner-Denver Co.
- Oils (Lubricating)** Gulf Refining Co.
- Socony-Vacuum Oil Co. Inc.
- Texas Company
- Oil Separators** Air-Maze Corporation
- Packings (Pump, Valve, etc.)** B. F. Goodrich
- Goodyear Tire & Rubber Co.
- Thermoid Rubber Co.
- Paint (Asphalt)** Texas Company
- Pallets** Besser Mfg. Co.
- Commercial Shearing and Stamping Co.
- Miles Mfg. Co.
- Multiplex Concrete Mfg. Co.
- Stearns Mfg. Co.
- Pavers (Concrete)** Koehring Co.
- Perforated Metal** Chicago Perforating Co.
- Cross Engineering Co.
- Harrington & King Perf. Co.
- Hendrick Mfg. Co.
- Taylor-Wharton Iron & Steel Co.
- Pipe Machines** Besser Mfg. Co.
- Quinn Wire & Iron Works
- Pipe Molds (Concrete)** Besser Mfg. Co.
- Quinn Wire & Iron Works
- Stearns Mfg. Co.
- Universal Concrete Pipe Co.
- Plates** Cross Eng. Co.
- Plates (Double Corrugated)** Hendrick Mfg. Co.
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- Poidometers** Schaffer Poidometer Co.
- Portable Conveyors** Barber-Greene Company
- Fuller Company
- Geo. Halsey Mfg. Co., Inc.
- Link-Belt Co.
- Portable Crushing and Screening Unit** Good Roads Machy. Co.
- Pioneer Gravel Equipment Mfg. Co.
- Smith Engineering Works
- Williams Patent Crusher & Pulv. Co.
- Portable Loaders** Jeffrey Mfg. Co.
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- E. I. du Pont de Nemours & Co., Inc.
- Hercules Powder Co.
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- Power Transmission Equipment** Standard Pressed Steel Co.
- Precipitators, Electrical** Western Precipitation Co.
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- Pulverators** Allis-Chalmers Mfg. Co.
- Pulverizers (See also Crushers, Mills, etc.)** Allis-Chalmers Mfg. Co.
- American Pulverizer Co.
- Babcock & Wilcox Co.
- Bonnot Company
- Bradley Pulverizer Co.
- Dixie Machy. Mfg. Co.
- Gruendler Crusher & Pulv. Co.
- Hardinge Co., Inc.
- Jeffrey Mfg. Co.
- Kennedy-Van Saun Mfg. & Engr. Corp.
- New Holland Machine Co.
- Pennsylvania Crusher Co.
- Ramond Bros. Impact Pulv. Co.
- F. L. Smith & Co.
- Startevant Mill Co.
- Williams Patent Crusher & Pulv. Co.
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**Pumps (Cement)**  
Fuller Company

**Pumps (Cement Slurry)**  
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The Dorr Co.

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**A. R. Wilfley & Sons**

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**Allen-Sherman Hoff Co.**

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Besser Mfg. Co.

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**Northwest Engineering Co.**

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**Nordberg Mfg. Co.**

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**Sturtevant Mill Co.**

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**Universal Vibrating Screen Co.**

**Williams Patent Crusher & Pulv. Co.**

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**Hardinge Company, Inc.**

**Lewistown Fdy. & Mach. Co.**

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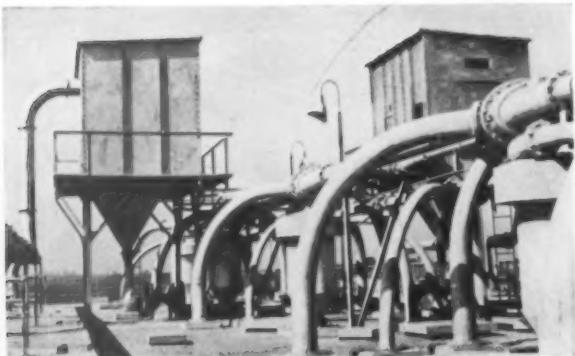
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**HARDINGE CONICAL MILLS**  
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**CONSTANT WEIGHT FEEDERS**



Two Sly Dust Filters on roof of cement silos.

# Sly DUST Experience "HOLDS THE KEY" TO THE MOST COMPLETE AND ECONOMICAL SOLUTION OF DUST PROBLEMS.

Dust has no place in efficient plant operation. It is a nuisance. It is a hazard. It represents a considerable loss of your product. Sly Dust Control Systems will do a thorough job of dust suppression, collection and disposal.

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**FOR DUST CONTROL**  
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INDENTED VIBRATING SCREEN PLATE



1937

ECONOMICAL  
UNDER ALL  
CONDITIONS  
OF SERVICE

CROSS SCREENS are designed for accuracy — Speed — long life and low upkeep. The tougher the service, the greater the appreciation of CROSS features. CROSS SCREENS are Self Framing — More Easily Installed — Blind Less and Improve the Product Screened.

We invite comparison. Make your next screen a CROSS SCREEN and you'll see the difference in dollars and cents.

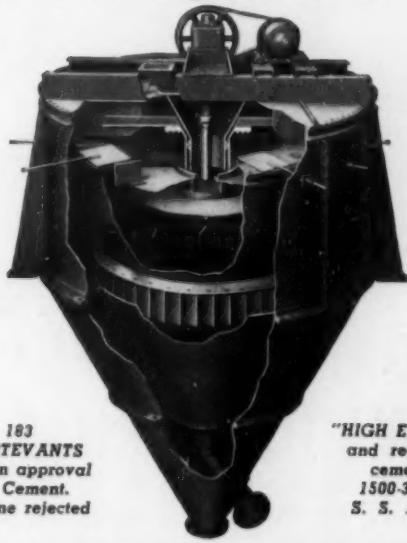
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Air Separators



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STURTEVANTS  
sold on approval  
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Not one rejected

"HIGH EARLY"  
and regular  
cement  
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Engineered Installations for raw or clinker show  
25 to 100% capacity increase.

STURTEVANT MILL CO. Harrison Square BOSTON, MASS.

### WORTHINGTON PNEU-FEED for drilling snake holes



A modern tool that speeds up  
drilling operations and conserves man power

- Replaces the wooden plank and back-breaking push.
- Can handle steel changes up to 6 feet.
- Peg legs, adjustable for length and position, make it easy to set for position of hole, whether for very flat snake hole drilling or breast drilling.
- Hole spotter collars hole without danger to operator.
- Air control takes drills up to 3-inch cylinder diameter.
- Retracts machine and steel as well as feeds them to the rock.
- One man can handle it... weight without drill, 190 pounds
- Adjustable head takes any hand-held drill.
- Uses less than one cubic foot of air per minute.
- Simple and sturdy... a time and money saver.

RD7-1



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• Gardner-Denver WDS Wagon Drill  
drilling toe holes in limestone quarry.

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Fully adjustable to practically any drilling  
position . . . able to clean any depth of

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Denver Wagon Drills  
bring you the certainty  
of getting more footage  
per shift, every shift.  
Large diameter wheels  
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make moving easy.  
Bulletin WD gives  
complete information  
— write us for it!



• Fitting in where larger wagon  
drills cannot operate, the Gardner-  
Denver UMB 6-foot Change  
Wagon takes any standard Gardner-Denver Drill.

**GARDNER-DENVER COMPANY**  
Quincy, Illinois

Since 1859

**GARDNER-DENVER**

# (AMSCO)

TRADE MARK REGISTERED

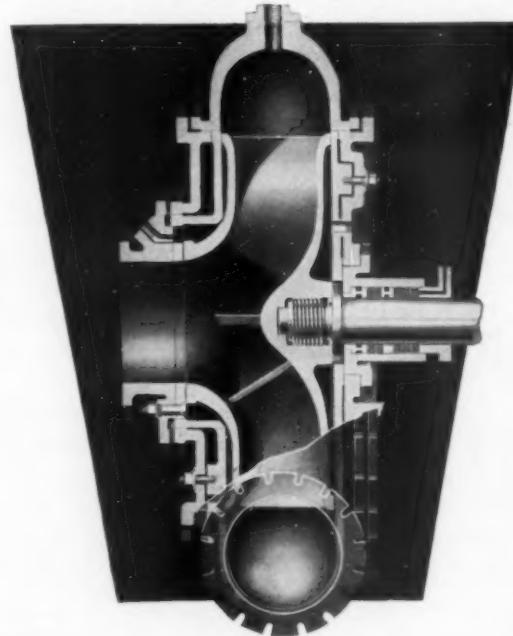
## COUNTERFLOW DESIGN in PUMPS New and Old!

AMSCO "COUNTERFLOW" design is available in all sizes and types of new AMSCO Pumps and almost all types and sizes of AMSCO Pumps now in service can be readily converted, at nominal cost, to take full advantage of the savings that "COUNTERFLOW" design effects.

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Dredge and sand handling pumps of AMSCO "COUNTERFLOW" design have a greatly increased service life because of two outstanding features: internal wear is minimized, and AMSCO Manganese Steel, "the toughest steel known," affords complete impact and abrasion resistance.

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Business profits depend on the continuous operation of your crusher. When your crusher breaks down profits cease. A moment lost is a dollar lost! Your crusher must be dependable.

Birdsboro-Buchanan Crushers are unsurpassed in workmanship and materials. No effort is spared in producing a better machine—crushers that outlast the plant. Each machine is designed and built for the job it has to do.

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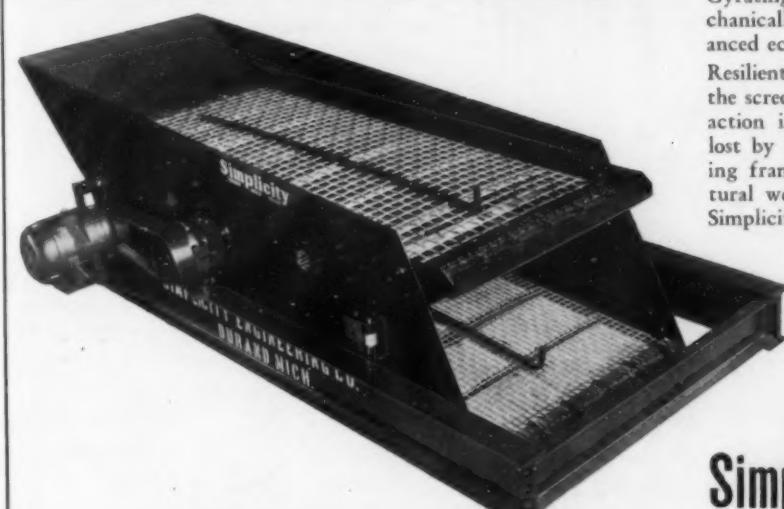
account for the satisfactory performance of Birdsboro-Buchanan Crushers.

**C. G. BUCHANAN CRUSHING MACHINERY DIVISION**  
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This superiority is built right into the Simplicity Gyrating Screen. It is the original type of mechanically vibrated screen using the counter balanced eccentric shaft.

Resilient rubber mountings are used to support the screen corners so that all the positive gyrating action is imparted to the screen decks and not lost by being dissipated throughout the supporting frame work. This eliminates excessive structural wear and increases the screening efficiency. Simplicity Gyrating Screens have been in general use in various industries for more than a decade.

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for  
EXACTING GRADATION  
CLASSIFICATION  
SILT REMOVAL  
DEWATERING

Accurate classification to produce CONCRETE, MASON and ASPHALT sands to meet the most rigid state and local specifications.

We can determine the proper classifying and settling areas required to give you the maximum quantities of each grade if we know (1) the average screen analysis of your sand, (2) the volume of water accompanying the sand, (3) the products you wish to produce.

More than fifty (50) ALLEN TANKS are recovering fine sand previously lost in the overflow of drags, screws and other types of mechanical classifiers.

ALLEN TANKS are built in large sizes, thus giving ample settling areas to drop out the finest sizes but permitting the overflow of silt.

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ENGINEERS  
30 Church St. New York City

for Larger  
pump  
capacities



The nozzle head manufactured only under Eagle patents. It has no equal.

# EAGLE

"SWINTEK"  
SCREEN  
NOZZLE  
LADDER

They pump more solid material—lower cost of material produced—and show surprising increase in production over plain suction with operating costs often reduced by more than 50%.

The cutters loosen deposit and insure uniform feed of solids, at the same time carrying oversize up the ladder as the endless chain passes over the nozzle acting as a screen.

Send for descriptive bulletin covering the many outstanding advantages of the Eagle "Swintek." Also ask for particulars for the cleaning of Sand and Gravel.

**EAGLE IRON WORKS**  
Des Moines, Iowa



25 TON STEAM CRANE

30 TON DIESEL CRANE

75 TON ERECTION CRANE

## Choose YOUR Crane from the one COMPLETE line

You may say "I'm not interested in who builds the most complete line of cranes. All I want is the best machine and the most economical one for my handling work." You're right, but who would naturally be best equipped to build it? Industrial Brownhoist builds cranes in capacities of 6½ to 200 tons, on railroads or crawler mountings, with steam, Diesel, gas or electric power and to handle all kinds of materials. Into the design and construction of each crane goes the experience gained from all of them, over a period of 50 years and in all classes of service. And so, without prejudice, we can recommend the right size and type crane for your work... Do you need a more economical method of handling materials? Industrial Brownhoist is better equipped today than ever before to provide the answer.

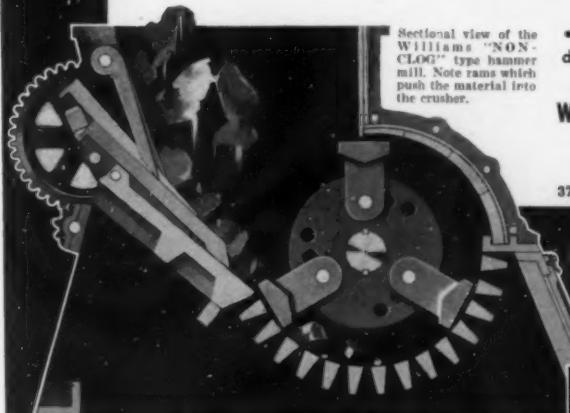
## INDUSTRIAL BROWNHOIST

GENERAL OFFICES: BAY CITY, MICHIGAN  
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### A MORE SIMPLE NON-CLOG CRUSHER...

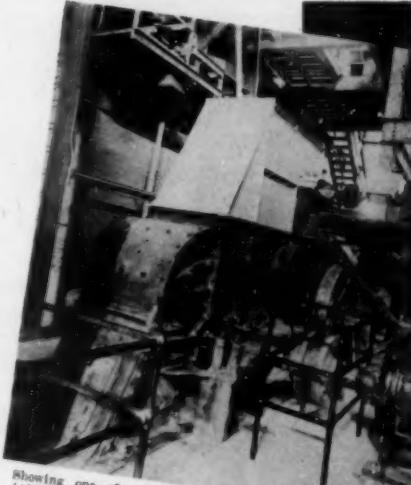
Less complicated with fewer parts to get out of order and an ability to crush finer— $\frac{3}{4}$ " if desired—are the outstanding advantages of the Williams Pusher type NON-CLOG Crusher. It handles wet rock and rock containing clay and shale overburden, taking the material as wet as it can be handled by a shovel and reduces it to  $\frac{3}{4}$ ", 1" or  $1\frac{1}{2}$ ", depending upon adjustment.

The two pushing rams comprise the entire NON-CLOG equipment. Mounted on an eccentric driven from the main crusher shaft, these rams slide up and down over the breaker plate, keeping it clean and pushing the material into the path of the crushing hammers. The breaker plate itself is stationary and the opening between it and the first grate bar is always the same, and there is no possibility of oversize rock passing through.



Sectional view of the Williams "NON-CLOG" type hammer mill. Note rams which push the material into the crusher.

• • • Write for more descriptive bulletins • • •



Showing one of the many Williams "NON-CLOG" installations in a large southern cement plant.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.

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SAN FRANCISCO  
328 Rialto Bldg.

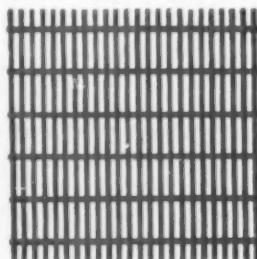
**Williams**  
OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD  
**Williams**  
PATENT CRUSHERS GRINDERS SHREDDERS

*get this  
NEW  
CATALOG  
of Owen  
Buckets*



for DIGGING •  
for RE-HANDLING •  
for SPECIAL USES •

THE OWEN BUCKET COMPANY  
6040 Breakwater Avenue, Cleveland, Ohio  
Branches: NEW YORK • PHILADELPHIA  
CHICAGO • BERKELEY, CAL.

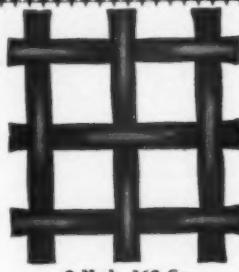


Rolled Slit  
**ALLOY  
No. 2**

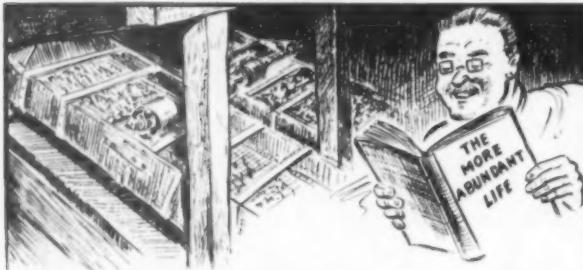
## STAR PERFORMERS

CLEVELAND SCREENS are star performers—returning larger capacities, increased profits and more accurate separations at lower cost. Cleveland Screens save money with the initial investment because, if they are made of the longer-wearing, wear-resisting ALLOY NO. 2—Cleveland Screens stay on the job long after ordinary screens would have been replaced.

★ THE CLEVELAND WIRE CLOTH & MFG. CO.  
3574 E. 78TH STREET . . . . . CLEVELAND, OHIO



3 Mesh .162 Ga.  
MORE  
PROFITS  
FOR YOU



## REQUIRE NO ATTENTION

"We are pleased with your Screens, as they do more work and require no attention."

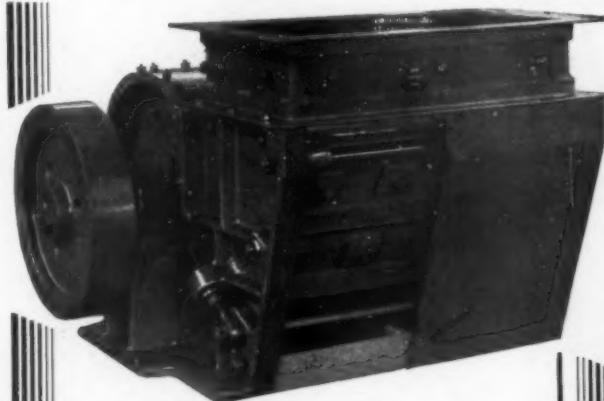
So writes another satisfied user of the UNIVERSAL VIBRATING SCREEN. This screen requires the minimum of attention because it is trouble proof, sturdily built, smooth running and free from trouble-inviting gadgets. There are no trick parts to worry over. You want efficient, accurate screening results at lower cost. The UNIVERSAL VIBRATING SCREEN gives you just that.



UNIVERSAL VIBRATING  
SCREEN CO.  
RACINE, WISCONSIN

It costs you less to begin with, less to operate and less to maintain. That's why 40 to 50% of the UNIVERSAL VIBRATING SCREENS produced are sold on reorders from satisfied users.

Write for catalog and prices.

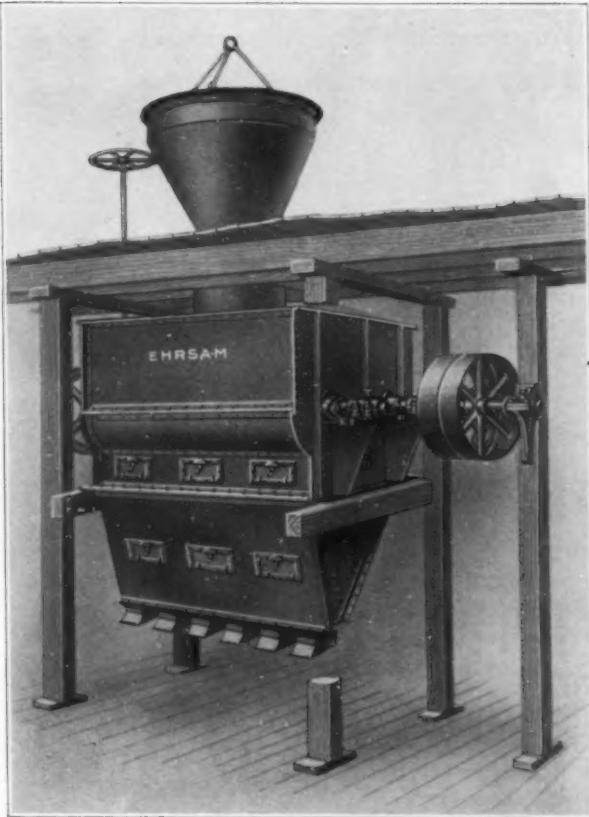


Front View Showing Breaker Plate Adjustment

## THEY COST LESS

AMERICAN Crushers cost less to begin with and cost less to operate. SKF Spherical Roller Bearings cut power and lubrication costs. Cast Steel Adjustable Platen prolongs life of crusher as does the Manganese Lined Crushing Chamber. No slivers or chips to cut into profits. Have a sturdily built crusher that always makes good. Write for complete details.

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### Double Barrel Plaster MIXER

For Mixing Dry Ingredients Such as Plaster-Paris or Stucco with Fibre and Retarder. Also various Ingredients with Stucco, Portland Cement, Lime and Sand.

Equipped for Hand Sacking or Bates Bagger.

Used in Gypsum Plaster Mills Throughout the United States.

Capacities from Ten to Twenty Tons per Hour.

We specialize in the manufacture of calcining kettles, crushing and grinding equipment for gypsum plaster plants. Also the manufacture of wet mixers, forming machines and automatic cut-off machines and other equipment for the manufacture of gypsum wall board.

We also have complete engineering service for the lay-out and general design of such plants.

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W. H. KENT, 549 W. Washington Blvd., Chicago

The J. B. Ehrsam & Sons Mfg. Co.  
ENTERPRISE

KANSAS

— — — — —

# Investigate Blaw-Knox

## TRUKMIXERS



We would like to tell you why Blaw-Knox TRUKMIXERS and Agitators not only produce *better concrete*—but save you money in low depreciation and maintenance costs.

You should know about the mixing blade arrangement and the faster, superior mixing action; the accurate water control, and the fine points of engineering and construction which make the Blaw-Knox Trukmixer a dependable unit for uninterrupted service.

Investigate Blaw-Knox Trukmixers.

**BLAW-KNOX COMPANY**

2035 FARMERS BANK BUILDING  
PITTSBURGH, PA.

NEW YORK · CHICAGO · PHILADELPHIA · BIRMINGHAM  
Representatives in Principal Cities

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# Buckets

capacities  
1/2 to 15  
yards



The right type and size for every kind of work. Write for Catalog.

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GENERAL OFFICES: BAY CITY, MICHIGAN  
New York, Philadelphia, Cleveland, Chicago

... for Efficient Screening  
Over Entire Area

## USE LINK-BELT VIBRATING SCREENS •

Designed and built to be easy on itself — to avoid unnecessary wear—the Link-Belt Vibrating Screen lasts a long time with few repairs. Low in first cost — low in maintenance—an economical screen to operate. Send for 24-page illustrated catalog, complete with clearance diagrams and dimension tables on the two distinct types of Link-Belt vibrating screens ("UP" and "PD").



Ask for No. 1562.  
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Company, Philadelphia,  
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offices located in  
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9074

## PRODUCE HIGH EARLY STRENGTH

Normal, all-purpose, masonry, plastering and stuccoing cements under the several BLANK patented processes.

*Inquiries invited from producers of cement, lime and allied products.*

Patents issued and pending in the United States, Canada, and in leading Central and South American and European Countries.

Investigations and experimental tests carried out at plants of interested producers by technical experts familiar with processes at no cost to producer.

## CEMENT PROCESS CORP.

Cement Plants Division  
JOHN A. BLANK, Mgr.  
R. F. D. No. 1,  
Allentown, Pa.

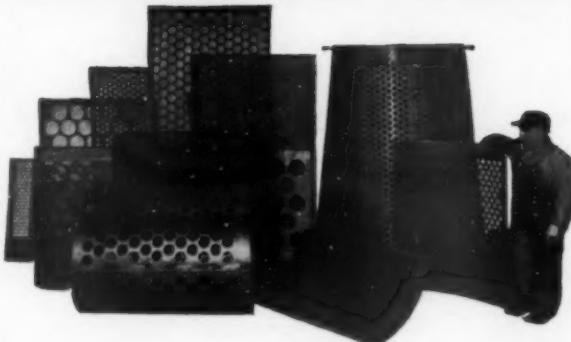
MAIN OFFICE  
90 Broad Street  
New York  
P. O. Box 574,

Lime Plants Division  
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P. O. Box 574,  
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## SCREENS

of Perforated Metal



For Sand, Gravel, Stone and Ore. Perforations of all standard types, also of unusual sizes and layouts to give large production and reduced screening costs.

*The*  
**Harrington & King**  
PERFORATING  
Co.

5650 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N.Y.

INDEX of Applications

NEW FREE

Manganese Steel Handbook

Only 32 pages, but crammed full of information as to "where" and "how" and "why" Rol-Man will last longer where tough-hardness, strength and abrasion resistance is required. Hundreds of parts we have made in the last 15 years are alphabetically listed, to give a comprehensive picture of the type of service where Rol-Man excels. If you are troubled with the bugaboo of excessive wear and frequent breakage of any forged, rolled or pressed steel part, we feel sure this booklet will be most interesting.

True  
STEEL  
PRODUCTS

MANGANESE STEEL  
FORGINGS  STAMPINGS  
Rolled Products Wire & Rod Products

MANGANESE STEEL FORGE CO., CASTOR AVE. & BATH STS., PHILADELPHIA, PA.

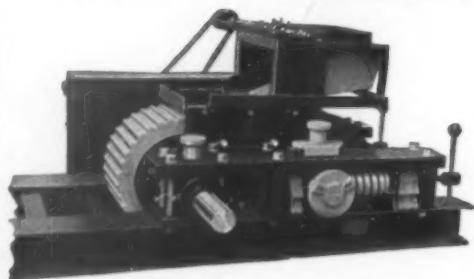
**tough going—but the Michigan is tougher!**

Michigan Shovels are built for frozen ground—soft fills—gravel pits—rock quarries—mud—in fact, for anywhere a truck can navigate! . . . Although constructed for heavy duty and long life, the Michigan is not a ponderous, slow-moving machine. Its 25 mile-per-hour road speed gets it on the job and earning long before heavier equipment could be transported—and at a fraction of the cost. . . . Model T-6 is faster in operation, too, due to fingertip air-controlled clutches and full-circle loading. . . . Michigan's quick convertibility solves more of today's construction and maintenance problems than any other like equipment. . . . Get Bulletin "RP." Write—

MICHIGAN POWER SHOVEL CO. Benton Harbor, Mich.

*Just look at that RUGGED FRAME made of HIGH TENSILE STEEL—double the strength of ordinary frames. Typical of the BALANCED STRENGTH found throughout the MICHIGAN*

# NEW HOLLAND ROLL CRUSHERS



Two-Roll Crusher with Pulsating Feeder

are the product of 25 years of practical experience. There is not a single "Bug" left in the mechanical construction. Built in 8 sizes with capacities from 4 to 80 tons per hour.

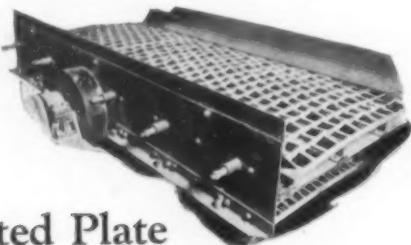
Smooth or ribbed shells. Sizes from 24" diameter up, have sectional shells held in place with taper wedges. Shells are replaced without dismantling the Crusher.

We specialize in complete Cinder Crushing Plants of capacities from 4 to 50 yards per hour.

New Holland Roll Crushers and New Holland Circle Throw Vibrating Screens are team mates.

◀ NEW HOLLAND MACHINE CO. ▶  
NEW HOLLAND, PA.

## VIBRATING SCREENS Are a TOUGH TEST of...



Perforated Plate

Knowing how severe is the service encountered by perforated plate in vibrating screens, Hendrick, by choice of materials and standards of workmanship, strives to prolong the period of service.

To this there is added the promptest possible service. The objective being to make of you a permanent Hendrick customer.

### HENDRICK MANUFACTURING CO.

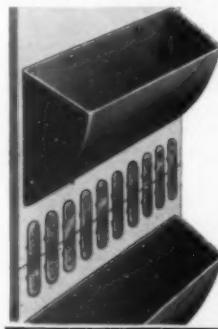
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SALES OFFICES IN PRINCIPAL CITIES  
PLEASE CONSULT TELEPHONE DIRECTORY

Makers of Elevator Buckets of all types. Mitco Open Steel Flooring, Mitco Shur-Site Treads and Mitco Armorgrids. Light and Heavy Steel Plate Construction.



•A Tight Butt Joint•  
for long life of  
Conveyor and  
Elevator Belts



Note how recessed plates compress belt end. Internal friction and ply separation in belt ends is overcome. The tight butt of the belt ends prevents passage of materials or liquids through the belt. Made in steel, "Monel Metal," non-magnetic and abrasion resisting alloys. Five sizes. Sold by jobbers and belting houses. Consultation regarding belt joining invited.

Sole Manufacturers  
**FLEXIBLE STEEL LACING CO.**  
4664 Lexington Street, Chicago  
In England at 185 Finsbury Pavement, London, E. C. 2

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—two cents a word. Set in six-point type.  
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#### REAL REBUILT EQUIPMENT

Send for our new list describing caterpillar and Locomotive Cranes, Overhead Electric Cranes, Gasoline Locomotives, Air Compressors, 120' to 2250', belted and motor drive, Electric Hoists up to 100-H.P., Caisson Equipment, Boilers, etc.

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2701 No. Broad St. Philadelphia, Penna.

30-ton Whitcomb Gasoline Locomotive.  
8-ton Plymouth Gasoline Locomotive.  
1245 ft. Ingersoll-Rand Compressor.  
450 ft. Ingersoll-Rand Compressor.  
Barber-Green Bucket Loader 42.  
100 H.P. Thomas Dragline Hoist.  
4½ x 6 Swinging Engine.  
2—Jackhammers.

J. T. WALSH  
Brisbane Bldg. Buffalo, N. Y.

#### PORTABLE COMPRESSORS

15—10x8 Ingersoll Rand.  
5—8x6 Ingersoll Rand.  
1—7x6 Ingersoll Rand.  
6—FM Wagon Drills with X71 Drifters.

EDWARD EHRBAR  
Incorporated  
29 Meserole Avenue Brooklyn, N. Y.

# USED EQUIPMENT FOR SALE

Classified Ads—\$4.00 per column inch. Positions or Help  
Wanted—\$1.00 per column inch, payable in advance.

An unusual offering!

## 6½ YARD MINING OR STRIPPING SHOVEL

Bucyrus 320-B 2200/4000 volt, 3 ph. 60 cycle, A.C.—250 volt D.C. Ward-Leonard control. 90 ft. boom and 58 ft. dipper stick. Built 1925 and used only two years. Very good condition. Located near Madisonville, Ky. Part cash terms if necessary.

## IRON & STEEL PRODUCTS, INC.

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Railway Exchange, Chicago, Ill.

"Anything so long as it contains IRON or STEEL."

3—30 Ton Steel Stiff Leg Derricks—65'—75' and 90' Booms. Complete with Electric or Steam Hoisting Engines.  
2—14x12 Ingersoll Rand Stationary Air Compressors—Type E R L. Price \$1500.00 each.  
1—Model 100 Austin Gasoline Operated Trench Digger. Price \$1000.00.  
5—Single, Double and Three Drum Hoisting Engines—Electric—Gasoline and Steam.  
50—Ingersoll Rand Type A—3" Jack Hammers—1½" Steel—Like New. Price \$75.00 each.  
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1—330 Cubic Foot Portable Gasoline Air Compressor—Like New. Price \$1250.00.  
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1—Lima 1½ Yard Combination Shovel and Crane. Price \$7500.00.  
1—Bay City Combination Backhoe and Crane—Model 16 B—¾ Swing. Price \$1250.00.  
1—Byers Bearcat Crane—30' Boom—¾ Swing—Running Condition. Price \$800.00.  
1—Model 100 Clectrac Tractor used less than six months. Price \$1000.00.  
1—Model 60 Tractor with Bulldozer—Good Condition. Price \$1000.00.  
2—20' Motor Saws Portable with Steam Engines—Good Condition. Price \$750.00 each.  
2—12' Morris Sand Pumps with Steam Engines—Good Condition. Price \$1000.00 each.  
1—1½ Yard Lakewood Clamp Shell Heavy Duty Bucket—Drilled for Teeth—Very Good Condition. Price \$300.00.  
Pneumatic Tools of All Kinds.  
Chain Hoists—All Sizes.  
Track Jacks—All Sizes.  
**BAKER AND GREENBERG**  
574 Hamilton Avenue Brooklyn, N. Y.  
South 8-4623

## MODERN EQUIPMENT

15—Belt Conveyors, 20—300'.  
1—701 Lima Gas Shovel.  
1—¾ yd. P. & H. 206 Shovel.  
6—1½ to 1-ton 36" gauge gas Locomotives.  
8—3 ton 36" Gauge Gas Locomotives.  
30—Western 4 yds. and 5 yds. Dumper Cars.  
2—807' Ingersoll-Rand XCB Compressors.  
1—1052' Ingersoll-Rand XCB Compressor.  
1—4'x12' Tel-Smith Vibrating Screen.  
1—No. 49 Kennedy Gyrotary Crusher.  
1—10"x20" Climax Jaw Crusher.  
1—2200' Cableway, complete.  
1—13"x18" McCulley Crusher.  
1—125 H.P. Atlas Diesel.  
1—125 H.P. 6 cyl. Hall-Scott Gas Engine.

**COAST-TO-COAST STEEL & EQUIPMENT CORPORATION**

101 West 31st St. New York, N. Y.

## FOR SALE

12—5-yd. 36" ga. Western Dump Cars.  
6—2-yd. 36" ga. Koppel Steel V Dump Cars.  
4—2-yd. 36" ga. Inslay Steel V Dump Cars.  
2—9½-ton 36" ga. Whitcomb Gasoline Locomotives.  
1—9x18 Sturtevant Vertical Steam Engine.  
1—10x12 Ingersoll Steam-Driven Air Compressor.  
1—9x10 Lidgerwood 2-Drum Steam Hoist.  
1—8½x12 Lidgerwood S.D. Steam Hoist.  
2—12-yd. Western std. ga. Air or Hand Dump Cars.  
2—40-ton Baldwin S.T. Locomotives, 14x22 cyls.  
Rails—First-Class Relay Rails and Bars, 60, 70, 80, 85, 90 and 100 lb. Rails, Tie Plates, etc.

**HYMAN-MICHAELS CO.**  
20 N. Wacker Dr. Bldg., Chicago  
Railway Exchange Bldg. 101 West 31st St. New York

Gyratory Crushers: 5K, 6K, 8K Allis Chalmers, 12' Traylor Bulldog. Jaw Crushers: 6x20 Sturtevant, others up to 6x24. Rotay Kilne: 8x110 and 6x60. Sturtevant Balanced Rolls: 30x16, 20x14, 16x10, other rolls 5x20, 42x24, 42x16, 36x16, 30x14, 24x14. Jeffrey B—36x24 Hammermill. Grueindler XXB Mill with Air Separator. Hardinge Mills: 3'0"x3'6", 7'x22", 8'x22". Ruggles Coles 4x20. Indirect Rotary Dryer. Other Dryers, 44"x25' Semi, 5'9"x25", 4'6"x30'. 2—4'x10'—2 deck Robbins Gyrex Screens. ¾ and 1½ yd. Marion A.C. Electric Shovels. Tube Mills 5x22 and 5½x20. Austin Style 100 Trencher. Galion EZ Lift Motor Grader. No. 1½ Sturtevant Ring Roll Mill. Guy Derrick Handling Outfit, 60 HP. Gas, 60' mast and boom.  
1 yd. Sauerman Elec. Slackline Outfit.

**TIDEWATER EQUIPMENT & MACHINERY CORP.**

875 Sixth Ave. New York, N. Y.

## FOR SALE

Polysius Size 14 Zet Crusher  
12"x12"x10"  
50 Tons per Hour  
With G.E. 100 H.P. Supersynchronous Motor for Operating Crusher.

Also 1—100 H.P. Vulcan No. 86 Single Drum Geared Electric Hoist, Completely Equipped with 100 H.P. G.E. Motor. This Equipment has NEVER Been Used.  
**Address Box No. 771, care Rock Products, 205 W. Wacker Dr., Chicago, Illinois.**

## FOR SALE

1—9"x10" Clyde double cylinder, 3-drum steam hoist with boiler.  
1—7"x10" American double cylinder, 2-drum steam hoist, ASME boiler 125 lbs.  
1—7"x10" Lambert double cylinder, 3-drum steam hoist, ASME boiler 125 lbs.  
1—1½-yd. Sauerman Crescent Type Drag Scraper Bucket, manganese teeth.  
1—1-yd. Sauerman Crescent Type Drag Scraper Bucket, manganese teeth.  
1—9"x16" Indiana Jaws Crusher.  
1—8" Holtz sand and dredging pump—belt driven.  
1—6" Holtz sand and dredging pump—belt driven.

We also have a large stock of electric motors, turbines and engine driven generators, sets, boilers and power plant equipment. At all times in the market for good used equipment. Send us your inquiries.

**TENNESSEE MACHINERY COMPANY**

121 3rd Ave. South Nashville Tenn.

## PRICED RIGHT FOR QUICK SALE

Ing.-Rand Imperial Type 14, 8x8—210 ft. displ. 100 lb. pressure Air Compressor, direct connected to Waukesha Gas Eng. Model P—4½x6½.

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## CONSOLIDATED GOOD USED EQUIPMENT

1—24"x36" Allis-Chalmers Jaw Crusher.  
1—42"x48" Traylor UNUSED Jaw Crusher.  
1—30"x42" Buchanan, Type C, sectional.  
1—42"x60" Bacon Farrel Crusher.  
1—2' Symons Cone Crusher.  
4—6' & 10' Allis-Chalmers McCully Crushers.  
3—20', 36' Allis-Chalmers Superior McCully Crushers.  
1—15x16" Pennsylvania Single Roll Crusher.  
1—24x24" Jeffrey Single Roll Crusher.  
3—30x16", 20x14" Sturtevant Crushing Rolls.  
5—Sturtevant Rotary Fine Crushers; Nos. 0, 1, 1½, 2.  
4—4"x8" Allis-Chalmers Screens, 2-deck, Texrope drive.  
2—3"x6" Niagara Screens, 2-deck Texrope drive.  
2—12x36", 3"x5' Jigger Screens, 2-deck.  
1—4"x12' Teasmith, 1-deck, with motor.  
8—Tyler Hammer Screens, 3x5', 4x5', 4x7'; types 31, 37, 39, 33, 60.  
2—Tyler V-22 Vibrators.  
2—3"x6", 4"x5' Sturtevant M. V. Screens, 2-deck.  
3—Raymond Roller Mills, 3 and 5-roll, high side; 5-roll low side.  
4—Raymond Pulverizers; No. 0000, No. 00, No. 1, No. 3.  
5—Raymond Imp Mills; No. 3, 32, 40, 55.  
2—3', 6', 10' Sturtevant Air Separators.  
2—30' Gayco Air Separators.  
2—Hardinge Iron Lined Ball Mills; 3"x8", 4½"x12", 6"x22", 8"x22", 9"x20".  
1—6"x22" Hardinge Silo Lined Pebble Mill; 8"x30", 8"x30", 8"x72" unlined mills.  
1—7'x5" Unlined Pebble Mill.  
1—No. 35 Marcy Ball Mill.  
2—6"x12" Hardinge Iron Lined Rod Mills.  
4—5"x26", 6"x35", 6"x45" Class "A" Double Shell Ruggles-Coles Direct Heat Rotary Dryers.  
10—Direct Heat Rotary Dryers; 3x30', 4x30', 5x50', 6x50', 6x60', 8x60'.  
8—Rotary Kilns; 6x60', 8x110', 8x125', 8'6" & 9'6"x150'.

Just a partial list.  
**WE WILL BUY A SINGLE MACHINE OR COMPLETE PLANT.**

What do you wish to sell? Send us details.

**CONSOLIDATED PRODUCTS COMPANY, INC.**

15-16-17 Park Row New York, N. Y.  
Plant and Shops at Newark, N. J.  
cover 8 acres of ground.

## FOR SALE:

Double drum Clyde Hoist 15 H.P. Leroy gas engine, 20' continuous conveyor, 20' discharge and conveyor. Metal 105 Northwest crane and derrick, old type machine but good condition for crane work; Hasgen derrick; Gardner-Denver portable 100 ft. air compressor with hose, drill, etc.; 1—85' Allis-Chalmers tractor with bulldozer; 1—12' yd. Austin-Western rubber-tired carryall scoop, like new; 1—Standard Gauge Davenport steam 4-wheel dinky engine 9x14, needs some repairing.

**COOGAN GRAVEL COMPANY**  
805-B Lehmann Bldg. Peoria, Illinois

## FOR SALE

75-Ton Baldwin six wheel switcher with separate tender, 21x26" cylinders.

72-ton American six wheel switcher with separate tender, 20x26" cylinders.

62-Ton Baldwin six wheel switcher with separate tender, 19x22" cylinders.

62-Ton Porter six wheel switcher with separate tender, 19x26" cylinders.

52-Ton Porter six wheel switcher with separate tender, 18x24" cylinders.

55-Ton Baldwin four wheel saddle tank, 18x24" cylinders.

50-Ton American four wheel saddle tank, 16x24" cylinders.

40-Ton American four wheel saddle tank, 14x22" cylinders.

Complete stock list on request.

**BIRMINGHAM RAIL & LOCOMOTIVE COMPANY**  
BIRMINGHAM, ALA.



This picture shows a 2 cu. yd., 700-ft. span Sauerman Slackline Cableway digging 150 tons of gravel per hour from a deep, wet pit. Material is handled in a straight-line operation to top of plant at cost of few cents per ton.

## SAUERMAN LONG RANGE MACHINES

In the Sauerman line of Drag Scrapers, Slackline Scrapers and Cableway Excavators there are machines to solve every problem—large or small—in pit or bank excavation, river dredging, stripping overburden, storing and reclaiming sand, gravel, crushed stone, etc. Several hundred installations of different sizes and types are illustrated and described in our new Catalog 18. Write for your copy of this catalog now.

SAUERMAN BROS., 430 S. Clinton St., Chicago

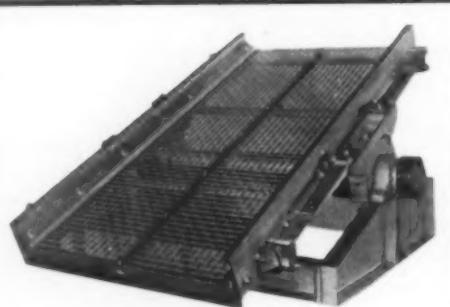


Above is illustrated one of the various ways of using Sauerman Drag Scrapers for storing and reclaiming materials on ground alongside plant. A drag scraper is the most economical and flexible equipment for storage work.

**HURDN**

## SCREENS

**HEAVY DUTY**



Gaining favor strictly on their merit—through production obtained and economies effected. You'll appreciate their accuracy of screening—the SKF Brute Bearings—Quick cloth change and Deck slope adjustment. Your requirements have been anticipated and are efficiently met in some specific type of HURON SCREEN comprising our line. Write for information and prices.

**HURON INDUSTRIES COMPANY**  
ALPENA, MICH.

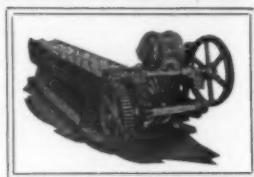
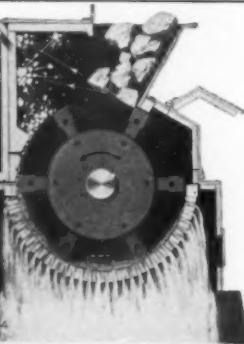
## Jeffrey Type B Swing Hammer Pulverizers

The Type B is used for the heavy work . . . Type A for lighter work. Either will give you dependable day-in and day-out service. Call on Jeffrey if you want the best in Reduction Machinery. A type and size for every purpose.

*Catalog No. 550-H*

**The Jeffrey Manufacturing Co.**  
935-99 N. Fourth St., Columbus, Ohio

**Why ship dirty stone  
when it can be made  
clean easily and so  
economically?**



**SCRUBBER**

**This scrubber will do the good work.**

*State Capacity Required!*

**LEWISTOWN FOUNDRY & MACHINE CO.**

*Mfrs. of Sand Crushing, Grinding, Washing  
and Drying Machinery*

**LEWISTOWN**

**PENN**

**COMPLETE HYDRAULIC DREDGES**

**SAND AND GRAVEL DREDGING PUMPS  
AGITATING MACHINERY  
DREDGE HOISTS  
STEEL HULLS • PONTOONS  
PIPE LINE ACCESSORIES**

**HETHERINGTON & BERNER, INC.**  
701-745 KENTUCKY AVENUE . . . . . INDIANAPOLIS, IND.

# CLASSIFIED ADVERTISEMENTS—Used Equipment for Sale

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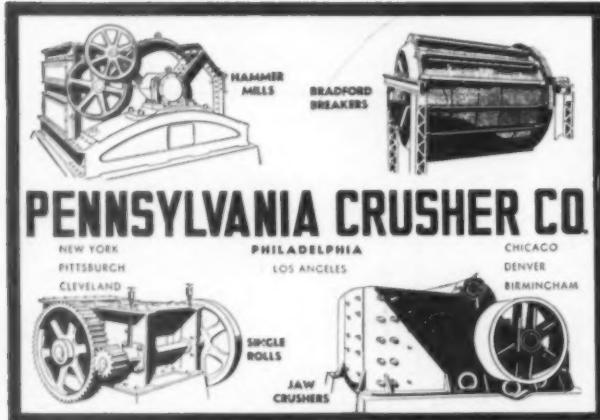
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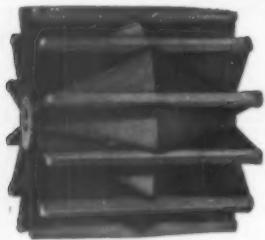
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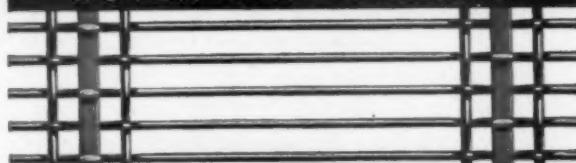
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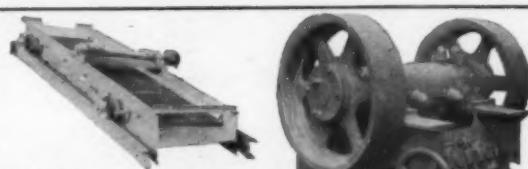
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### INDEX OF ADVERTISERS

Air-Maze Corp.	118
Allen Cone & Machinery Corp.	126
Allen-Sherman-Hoff Co.	126
Allis Chalmers Mfg. Co.	28
American Cable Co., Inc.	126
American Manganese Steel Co.	124
American Pulverizer Co.	128
Atlas Powder Co.	40
Audubon Wire Cloth Corp.	131
Babcock & Wilcox Co.	138
Bacon, Earle C., Inc.	103
Barber-Greene Co.	15
Bartlett & Snow, C. O., Co.	138
Besser Mfg. Co.	99
Birdsboro Steel Fdry. & Machine Co.	125
Blaw-Knox Company	129
Bonnot Co.	120
Bradley Pulverizer Co.	141
Broderick & Bascom Rope Co.	136
Buchanan, C. G., Co.	127
Bucyrus Monighan Co.	127
Calcium Chloride Ass'n.	115
Carnegie-Illinois Steel Co.	23
Cement Process Corp.	139
Chain Belt Co.	21-114
Chase Fdry. & Mfg. Co.	100
Chicago Perforating Co.	138
Classified Advertisements.	132, 133, 135, 137, 139
Classified Directory of Advertisers	116, 118, 119
Cleveland Rock Drill Co.	37
Cleveland Wire Cloth Co.	128
Commercial Shearing & Stamping Co.	100
Cross Engineering Co.	123
Dixie Machinery Mfg. Co.	141
Dorr Company	105
Du Pont de Nemours, E. I., & Co.	27
Eagle Iron Works.	126
Easton Car & Construction Co.	141
Ehrsam, J. B., & Sons	129
Ensign-Bickford Co.	30
Flexible Steel Lacing Co.	132
Frog Switch & Mfg. Co.	136
Fuller Company	8
Gardner-Denver Co.	124
General Electric Co.	20-113
Gilmer, L. H. Co.	25
Goodrich, B. F. Co.	3-142
Good Roads Machinery Corp.	119
Goodyear Tire & Rubber, Inc.	9
Gruendler Crusher & Pulv. Co.	138
Gulf Refining Co.	117
Haias, Geo., Mfg. Co.	109
Hardinge Company	121
Harnischfeger Corp.	18
Harrington & King Perf. Co.	130
Hayward Company	138
Hazard Wire Rope Co.	132
Hug Company, The	24
Huron Industries Co.	134
Industrial Brownhoist Co.	127-130
Jaeger Machine Co.	5
Jeffrey Mfg. Co.	41-134
Kennedy-Van Saun Mfg. & Engr. Corp.	19
Koehring Company	32
Leschen, A., & Sons Rope Co.	103
Lewistown Fdry. & Mach. Co.	134
Lima Locomotive Works.	22
Link-Belt Co.	1-130
Ludlow-Saylor Wire Co.	136
Manitowoc Engineering Co.	111
Manganese Steel Forge Co.	131
McLanahan & Stone Corp.	137
Mepham, Geo. S., Corp.	100
Michigan Power & Shovel Co.	131
Miles Mfg. Co.	100
Morris Machine Works.	136
Multiplex Concrete Machy. Co.	101
National Supply Co.	11
New Holland Machine Co.	132
Nordberg Mfg. Co.	28
Northwest Engineering Co.	29
Owen Bucket Co.	128
Page Engineering Co.	140
Pennsylvania Crusher Co.	136
Pioneer Gravel Equipment Mfg. Co.	31
Portland Cement Ass'n.	88
Preformed Wire Rope.	38
Productive Equipment Co.	138
Quinn Wire & Iron Wks.	101
Raymond Bros. Impact Pulv. Co.	14
Robins Conveying Belt Co.	42
Roebling's, John A., Sons Co.	17-110
Ryerson, Jos. T., & Sons, Inc.	141
Sauerman Bros., Inc.	134
Schaffer Poidometer Co.	141
Simplicity Engineering Co.	125
Sly, W. W., Mfg. Co.	122
Smith, F. L., & Co.	16
Smith Engineering Wks.	13
Sprout, Waldron & Co.	136
Socony Vacuum Oil Co., Inc.	33-34
Standard Pressed Steel Co.	10
Stearns Mfg. Co.	101
Sterling Machinery Corp.	104
Stulz-Sickles Co.	138
Sturtevant Mill Co.	123
Tamms Silica Co.	100
Taylor-Wharton Iron & Steel Co.	107
Texas Co.	4
Thermoid Rubber Co.	12
Thew Shovel Co.	39
Timken Roller Bearing Co.	6
Traylor Engr. & Mfg. Co.	7
Tyler, W. S., Co.	141
United States Steel Corp. Subsidiaries	23
Universal Concrete Pipe Co.	136
Universal Vibrating Screen Co.	128
Western Precipitation Corp.	36
Wellman Engineering Co.	141
Willfey, A. R., & Sons, Inc.	138
Williams Patent Crusher & Pulv. Co.	127
Williamsport Wire Rope Co.	106
Worthington Pump & Machy. Corp.	123

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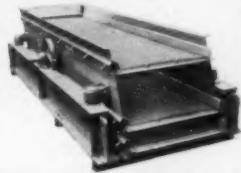
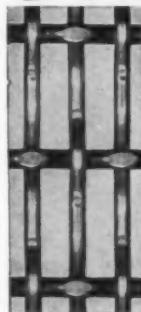
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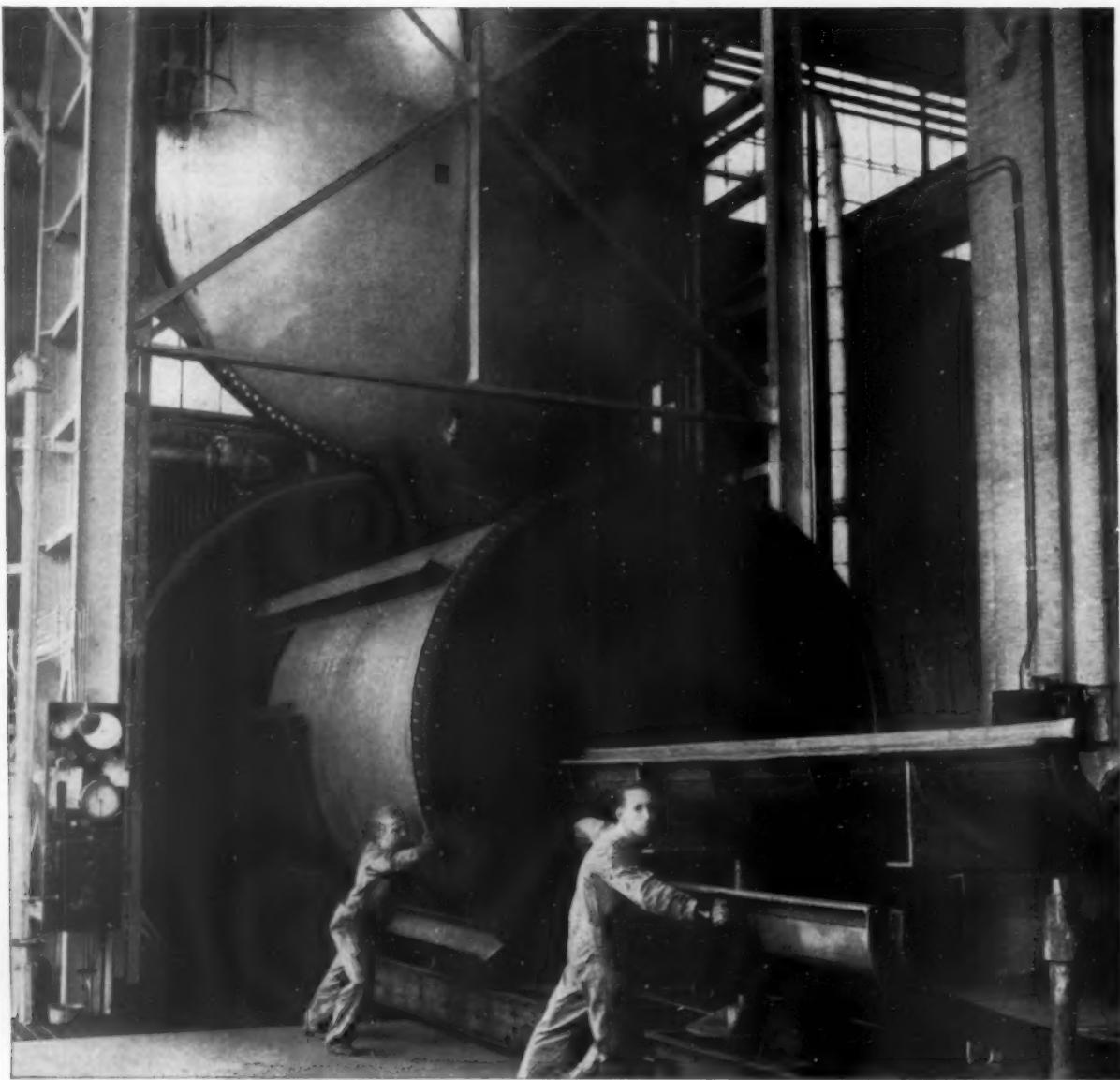
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